HP E1135C
POWER DISTRIBUTION UNIT

Operating and Service Manual

Manual Part No. E1135-90001

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HEWLETT PACKARD

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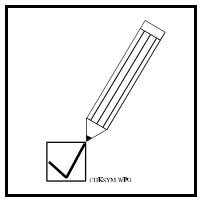
Emergency Shutdown (EMO) Switch Operation

When the Emergency Shutdown (EMO) Switch is pressed, it will immediately turn off all ac and dc power in the testhead. To reestablish ac power, pull the Emergency Shutdown (EMO) switch out (to the closed position) and switch the power distribution unit off for 15 seconds and on again to reset the ac circuits. To reestablish dc operating power, reboot the testhead.

Marking the PDU

After installing the PDU, check and mark the front and rear panels of the PDU as appropriate where you see this symbol.



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HP E1135C PDU Manual

MANUAL PRINTING HISTORY AND SYSTEM SOFTWARE REVISIONS

This page lists this manual's printing history and the test system's software revisions. If you receive manual updates or system software revisions, a new Printing History Page will accompany the updates and revisions. It is important that you insert the new Printing History Page in the manual and remove the old one.

Software Revision	Manual Revision
N/A	1st Printing, Rev. A, July 1998
N/A	Rev. B, May 1999
N/A	Rev. C, October 1999

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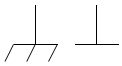
SAFETY SYMBOLS

Instruction symbol affixed to product. Indicates that the user must refer to the manual for specific WARNING or CAUTION information to avoid personal injury or damage to the product.

Indicates the field wiring terminal that must be connected to earth ground before operating the equipment — protects against electrical shock in case of fault.



Frame or chassis ground terminal — typically connects to the equipment's metal frame.

Alternating current (ac).

Direct current (dc).

Indicates hazardous voltage.

WARNING Calls attention to a procedure, practice, or condition that could result in bodily injury or death.

CAUTION Calls attention to a procedure, practice, or condition that could cause damage to equipment or permanent loss of data.

WARNINGS

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

Ground the Equipment For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes. For continued protection against fire, replace the line fuse(s) only with the fuse(s) of the same voltage and current rating and type. **DO NOT** use repaired fuses or short-circuited fuse holders.

Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, **DO NOT** perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

Do not service or adjust alone: Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Do not substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

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PRODUCT DESCRIPTION

The HP E1135C Power Distribution Unit (PDU), which is a direct replacement for the E1135A/B PDU, receives ac mains power and distributes it to several branch circuits. It is suitable for any OEM application in which branch ac circuits must be controlled locally or remotely. Fold this page out to identify the features of the PDU.

A **Mains Input** — A one-inch (25.4 millimeters) hole is provided for installing a strain relief for the mains input.

B **Mains Disconnect Switch** — For disconnecting power from the internal circuits of the PDU. For safety it is lockable (with a padlock) in the Off (0) position.

C **Outputs Enable Switch** — For normal control of the switched outputs,[1] which include the output terminal block and optionally, the rear panel receptacles (outlets). The outputs can also be controlled by an external switch or a dc signal.

D **Outputs Enabled Indicator** — This green LED indicates that the switched outputs[1] are on.

E **Line/EMO Error Indicator** — This yellow LED indicates that the input voltage has gone too high or too low or that Emergency Shutdown (or EMergency Off) has been invoked.

F **Circuit Breakers** — Ten 15-amp breakers for resetting the circuits to the output terminal block. These are NOT switches; any attempt to switch them off will damage them.

G **Egress Holes** — For routing loads and control circuits into the PDU.

H **Output Terminal Block** — For hard-wired loads (multi-outlet assemblies, instruments, rear panel receptacles (outlets)); these circuits are protected by the circuit breakers.

I **Rear Panel Receptacles**[2] — For plug-in loads; these receptacles (outlets) can be switched or un-switched.[1]

J **Control Board** — Controls all PDU functions. Remote output enable or Emergency Shutdown switches and branch control signals are wired to the Control Board.

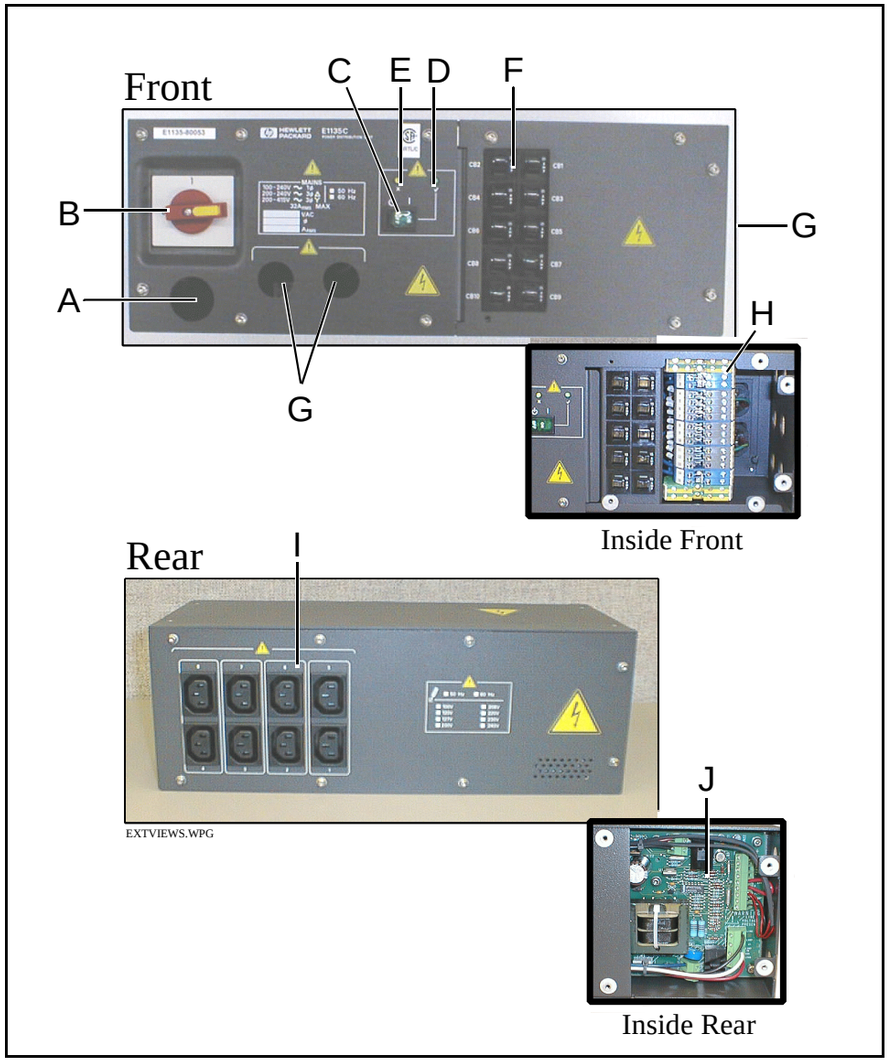

Figure 1. Features of the HP E1135C PDU

[1] "Switched" outputs are controlled by the PDU's Control Board; "un-switched" outputs are always on unless the Mains Disconnect is switched off.

[2] An IEC 320 ISA male plug mates to the receptacle.

Physical Description

The PDU occupies three EIA[1] units in a standard 19-inch rack. It measures 133 millimeters (5.25 inches) high, 368 millimeters (14.5 inches) wide, and 152 millimeters (6 inches) deep. The PDU weighs 4.4 kilograms (9.6 pounds). The color is graphite gray.

Operating Voltages

Table 1 lists the operating voltages (ac mains) of the PDU and indicates the pages that describe how to connect the different mains configurations to the PDU. The nominal operating frequencies are 50 or 60 hertz.

Table 1. HP E1135C PDU Operating Voltages

Input Voltage[2]	**Page**
120/208–240/415 V 3-Phase Wye with Neutral	25
208 or 220 V 3-Phase Wye	26
100/200–120/240 V Three-Phase Delta	27
120/208–240/415 V Single Phase Wye with Neutral	28
100/200–120/240 V Single Phase with Center-Tap Neutral	29
200–240 V Single Phase Non-Earthed	30
100–240 V Single Phase Earthed	31

[1] Conforms to Electronics Industries Association standard EIA-310-C. One EIA unit occupies 1.75 inches (44.5 millimeters) of vertical rack space.

[2] All voltages are nominal rms values. Voltages are listed in order of preference: the higher the mains voltage, the lower the mains current. Three-phase power is the most efficient.

Functional Block Diagram

The mains input is wired directly to the 4-pole Mains Disconnect Switch (Figure 2). From the Mains Disconnect Switch, current passes through the 4-pole contactor and 15-amp circuit breakers to the output terminal block. The contactor — controlled by the Control Board — switches power on and off to the output terminals. Receptacles (outlets) on the rear panel of the PDU can be wired to the input terminals (A) for un-switched power (fused at 10 amps) or to the output terminal block for switched power. Loads can be hard-wired to the output terminal block or plugged into the receptacles.

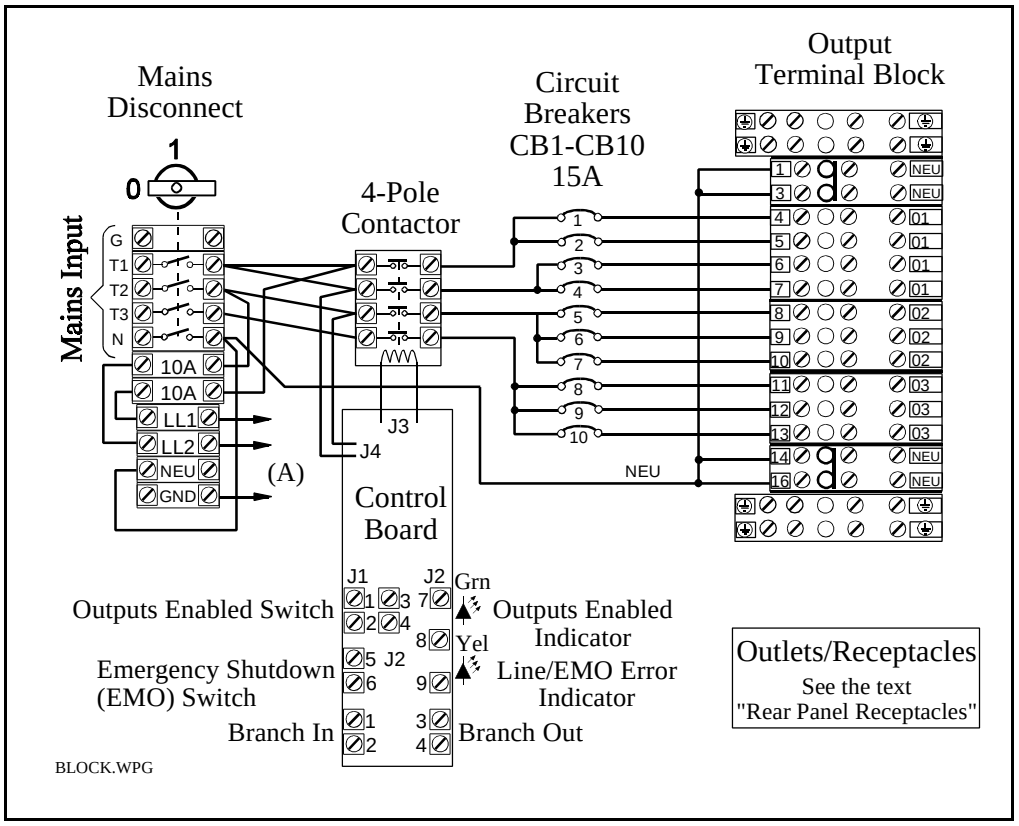

Figure 2. HP E1135C PDU Functional Block Diagram

Output Terminal Block

The output terminal block has two columns of screws and two columns of terminals as shown in Figure 3. In total there are 20 line terminals, 8 neutral terminals, and 8 ground terminals. As shown in Figure 2, each of the ten lines is protected by a 15-amp circuit breaker. Loads can be wired line-to-line or line-to-neutral depending on the mains configuration and the load voltage requirements.

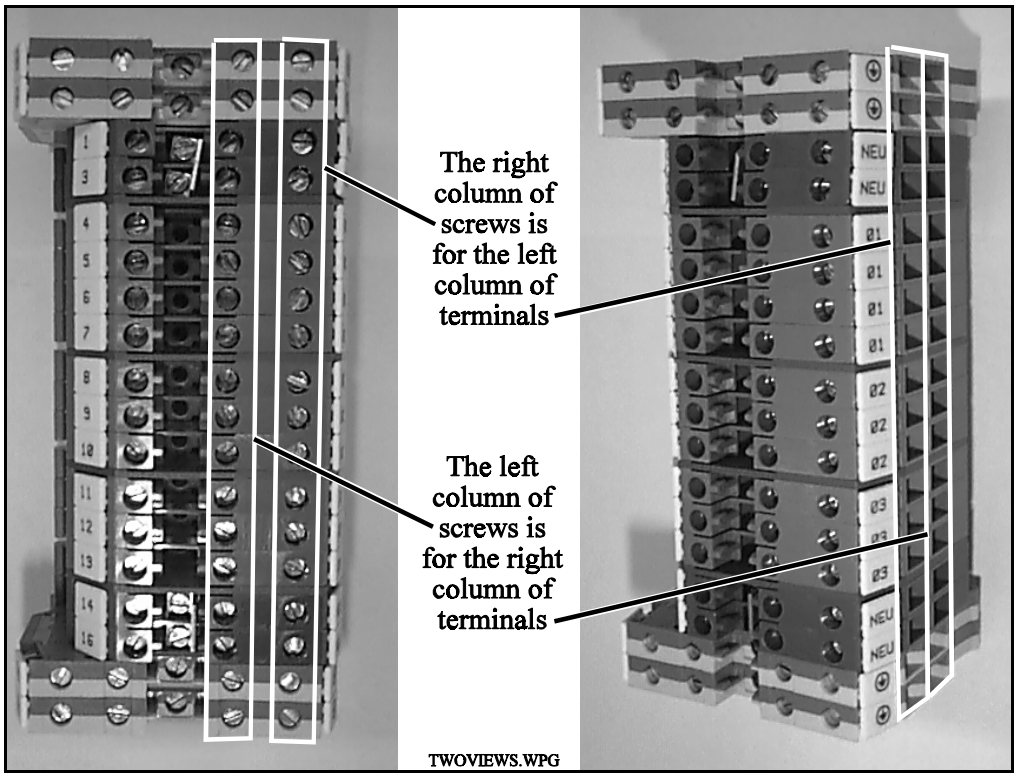

Figure 3. The Output Terminal Block

Rear Panel Receptacles

The PDU comes from the factory with the rear panel receptacles (outlets) wires cable tied together; not connected inside the PDU. Depending on the type of PDU ordered, the outlet circuits will come wired as two groups of four outlets or four groups of two outlets (Figure 5).

When installing the PDU, you must wire the receptacles for switched or un-switched operation (explained below).[1] They can be wired to separate branch circuits or to the same branch circuit. Wiring them to separate branch circuits maximizes the total available current and helps balance the loads on the ac mains.

If the ac mains input includes a neutral wire, the outlets should be wired line-to-neutral as shown. If there is no neutral wire, the outlets can be wired line-to-line. Never wire line-to-line if the phase voltage is greater than 240 volts.

Switched Operation — For switched operation, wire the rear panel receptacles to the output terminal block (Figure 3, page 5). In this configuration, the outlets are protected by 15-amp circuit breakers. They are called switched because they are under the control of the control board which opens and closed the contactor (see Figure 2, page 4).

Un-switched Operation — For un-switched operation, wire the rear panel receptacles to the input terminals LL1, LL2 and NEU (Figure 4, page 7). In this configuration, the receptacles are protected by 10-amp fuses in the input terminal block.

When wiring the outlet circuits, be sure to adhere to the stripping and torqueing specifications in Table 5, on page 23.

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[1] "Switched" rear panel receptacles are switched by the contactor under control by the PDU's Control Board; "un-switched" rear panel receptacles are always on unless the Mains Disconnect is switched off.

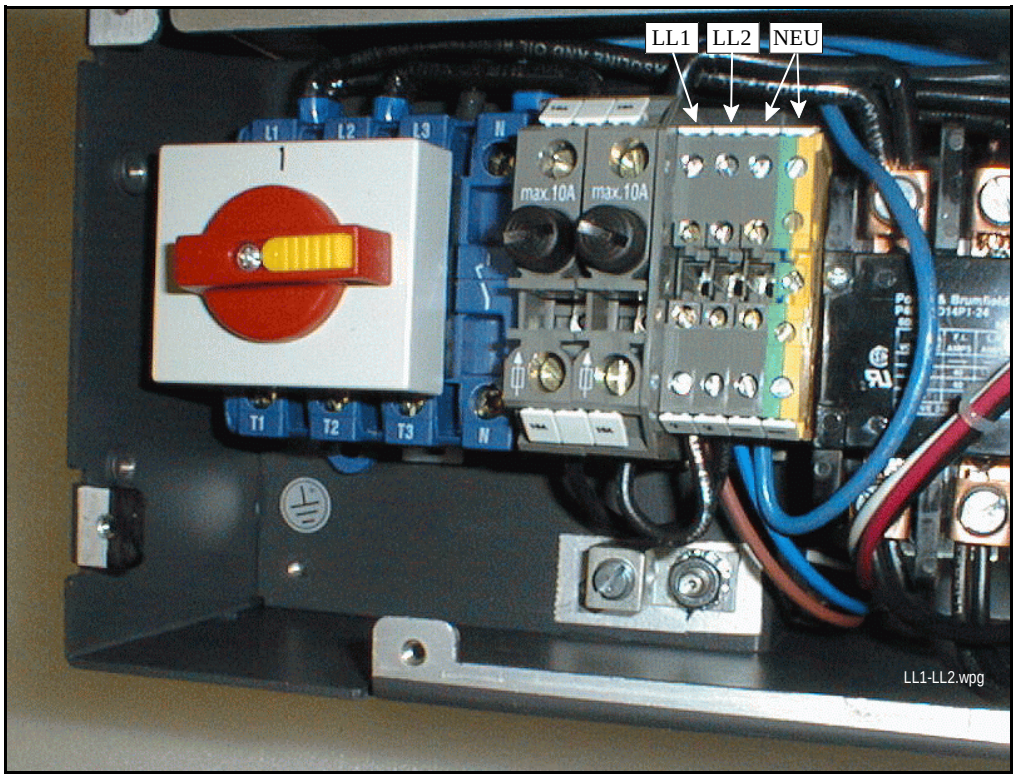

Figure 4. Terminal Block Connections

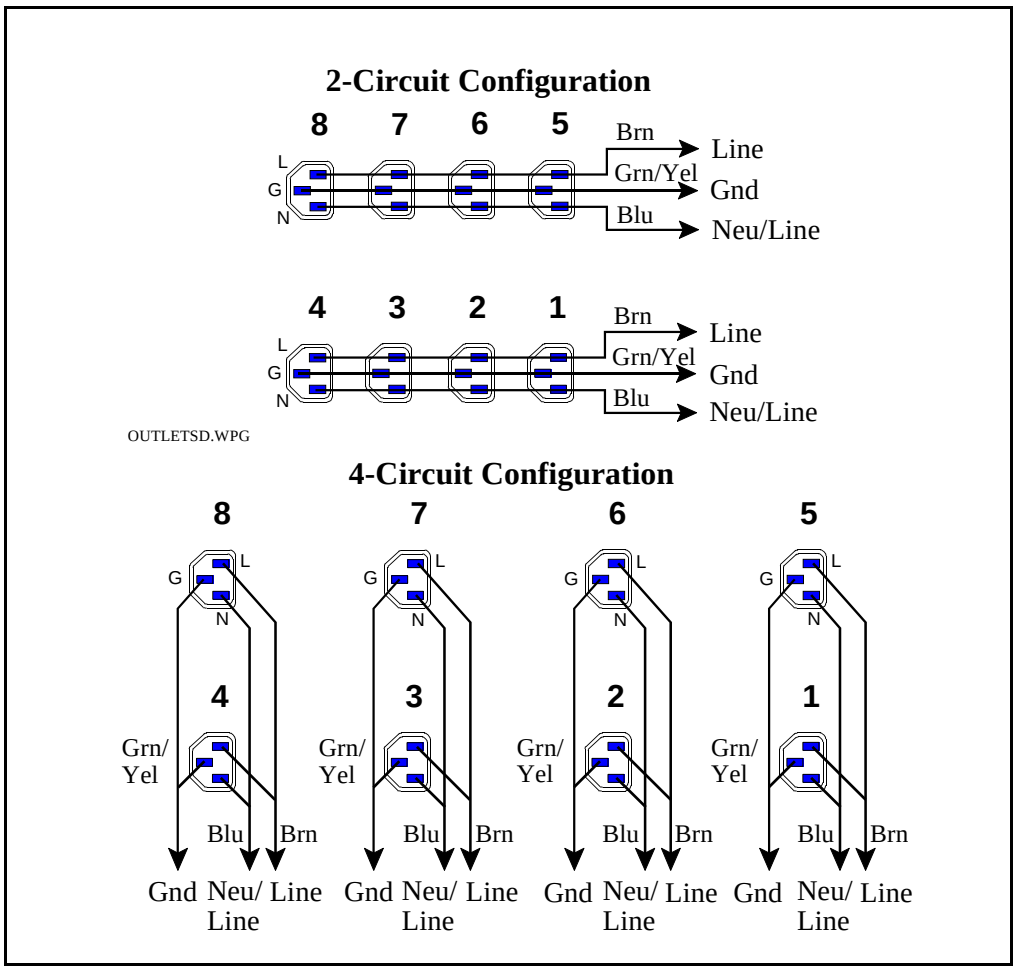

Figure 5. Configurations of Rear Panel Outlets (External View)

The Control Board

The Control Board contains circuitry that:

- monitors 2-phases (if available) of the ac mains voltage
- implements the Emergency Shutdown and mains/branch/sub-branch functions
- controls the contactor to energize the switched outputs.

The Control Board is shown in Figure 6.

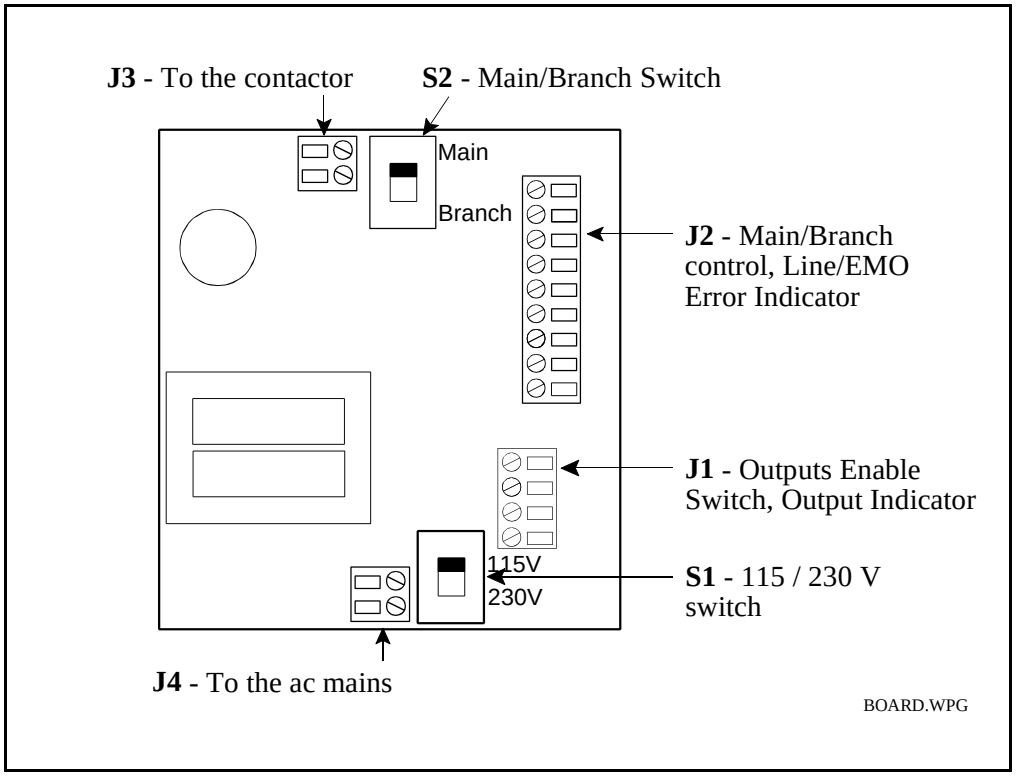

Figure 6. The Control Board

Switches on the Control Board

The Voltage Selector Switch (S1) sets the operating voltage of the power supply on the Control Board. It does NOT set the PDU for the mains configuration; that is done by the mains connection and a jumper on the input terminals on the Mains Disconnect Switch.

If S1 is incorrectly set to the 115V position and high mains voltage is applied, the Control Board will interpret it as a high-line condition and light the Line/EMO Error Indicator. If S1 is incorrectly set to the 230V position and low mains voltage is applied, the Control Board will interpret it as a low-line condition and light the Line/EMO Error Indicator. In both cases, there will be no damage to the PDU, and the outputs of the PDU cannot be turned on (enabled).

The Main/Branch Switch (S2) sets the PDU to be either a "main" PDU or a "branch" PDU. These functions are described on page 18.

Specifications

Table 2. Specifications of the HP E1135C PDU

Input Voltage:	100–240 volts single phase, 200–415 volts 3-phase, 50/60 hertz
Input Current:	32 amps max
Input Wire Size:	On the Mains Disconnect Switch: #8 AWG[1] 10 square millimeters (0.147-inch, 3.57 mm dia.) max wires[2]
Mains Disconnect:	600 volts, 60 amps, 4-pole, lockable
Output Voltage:	240 volts max
Output Current:	From the output terminal block: 15 amps max per branch circuit (10 circuits) From the outlets (receptacles): 15 amps max per circuit if switched (circuit breakers) or 10 amps max per circuit if un-switched (fuses)
Main/Branch PDU drive:	Can control up to 20 other E1135 PDUs
Operational Altitude:	2,000 meters (6,560 feet) max
Operational Temperature:	40 degrees C max
Operational Humidity:	80 percent R.H. max
Transients:	4,000 volts peak max (IEC installation category III)
Pollution degree:	2

The HP E1135C PDU is intended for indoor use only; DO NOT use it outdoors. The PDU conforms to the European Community Machinery Directive. There are no preventive maintenance requirements for the PDU. To clean the outer surface of the PDU, use a clean dry cloth.

PDU Product Matrix

The HP E1135C PDU is available under several different HP part numbers to reflect different configurations — as shipped from the factory — which are used by both HP and non-HP manufacturers. These configurations are shown in Table 3.

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[1] American Wire Gauge.

[2] If greater than 10 square millimeters (#8 AWG) wire size is required due to loading, a pigtail is required. See "Connecting a Pigtail to the E1135C PDU" on page 32.

The PDU comes from the factory with the rear panel receptacles (outlets) wires cable tied together; not connected internally (page 6). The installer of the PDU must connect the receptacle circuits as needed. Depending on the type of PDU ordered, the receptacle circuits will come wired as two circuits with four receptacles per circuit or four circuits with two receptacles per circuit. Also, the PDU may or may not include an Output Enable Switch; it is not included in units when a remote Output Enable Switch is being used.

Table 3. HP E1135C PDU Product Matrix

HP Part Number	2 Receptacle Circuits 4 Receptacles per Circuit	4 Receptacle Circuits 2 Receptacles per Circuit	Output Enable Switch Included
E1135-80050		X	No
E1135-80052		X	Yes
E1135-80053	X		Yes
E1135-80054		X	Yes
E1135-80056	X		No

Where to Get Help

If you need technical assistance with this product, contact HP's Measurement Systems Knowledge Center (MSKC). In the U.S. call 1-800-593-6635 with your MSKC support handle. Outside the U.S. call your local HP Service Representative to access the MSKC.

OPERATING DESCRIPTIONS

The Outputs Enable Switch

The Outputs Enable Switch switches ac mains power to the Control Board. The Control Board monitors the ac mains voltage and if it is within acceptable limits, it closes the 4-pole contactor, energizing the output terminal block. The Outputs Enable Switch can be removed from the front panel of the PDU and located elsewhere around a system (see "Wiring a Remote Outputs enabled switch" below).

When the Outputs Enable Switch is switched to the On position (closed), there is a 1-second delay before the contactor closes and the outputs are switched on. When the Outputs Enable Switch is switched to the Off position, the contactor is opened and the outputs are switched off immediately. If there are other branch or sub-branch PDUs wired to this PDU, they will be switched off simultaneously (see "The Branch Control Function" on page 18).

Wiring a Remote Outputs Enable Switch

The remote Outputs Enable Switch must be a double-pole, single-throw switch rated at 250 volts and 0.5 amp. It may or may not have an internal lamp. If a lamp/switch assembly rated for 250 volts is used, then the output J1-3 (LAMP w/30K) is used. Wire the switch to J1 on the Control Board as shown in Figure 7, page 14.

NOTE

If a branch or sub-branch PDU does not have its own Outputs Enable Switch, then it must have a jumper wired between terminals 1 and 4 of connector J1 on its Control Board; otherwise, the PDU cannot be enabled (turned on).

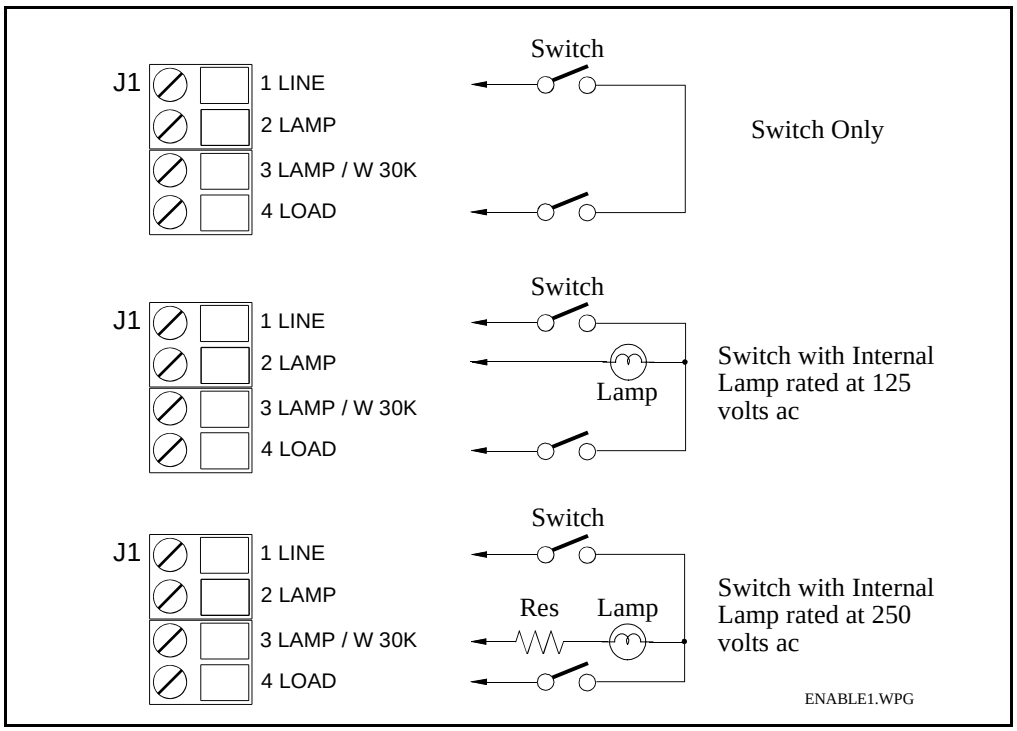


Figure 7. Wiring a Remote Output Enable Switch

Controlling the Output with an External Signal

To control the output using an external low-level dc signal, the PDU must be set up as a Branch PDU, which means that it is set up to be controlled by another PDU (page 18).

Set the Main/Branch Switch (S2) to the Branch position (page 9). With no Outputs Enable Switch wired to the PDU (J1), connect the external control wires to J2 pins 1 (+) and 2 (-). A twisted-pair or shielded cable works best for noise immunity. A voltage greater than 3 volts (at 500 microamps) will turn the PDU's outputs on; less than 3 volts turns the outputs off. The voltage must not exceed 100 volts.

When the outputs are on, an isolated signal between 10 and 15 volts dc is present at J2 pins 3 (+) and 4 (-). This signal can be used to control other PDUs.

The Outputs Enabled and Line/EMO Error Indicators

The Outputs Enabled Indicator will light whenever the contactor is closed. The Line/EMO Error Indicator will light when a high-line or low-line condition or Emergency Shutdown occurs. If you desire an Outputs Enabled or Line/EMO Error Indicator located elsewhere around a system, see "Wiring a Remote Outputs Enabled or Line/EMO Error Indicator" below.

Wiring a Remote Outputs Enabled or Line/EMO Error Indicator

The PDU provides 2 volts dc at 7 milliamps at the pins of J2. Wire the indicator to J2 on the Control Board as shown in Figure 8.

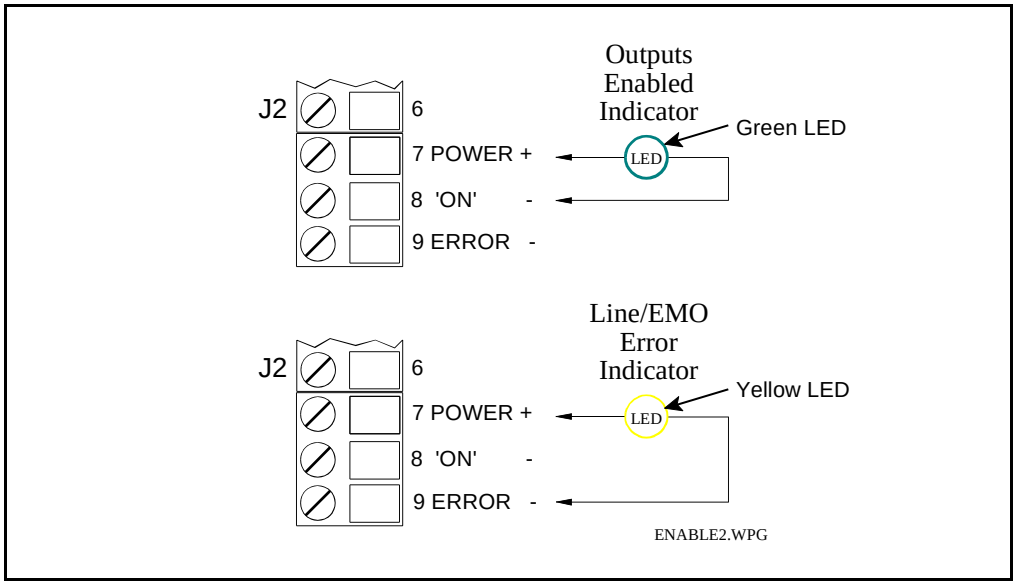


Figure 8. Wiring a Remote Outputs Enable or Line/EMO Error Indicator

The Emergency Shutdown (EMO) Switch

The Emergency Shutdown (or EMergency Off, EMO) function gives you the capability of switching off (opening) the switched outputs of the PDU immediately — in case of emergency — from any EMO switch located around a system. As many EMO Switches as desired can be

installed for safety and operator convenience. When an EMO Switch is pressed (opened), the yellow Line/EMO Error Indicator on the front panel of the PDU will light.

Restoring Power After an Emergency Shutdown

Once the EMO Switch has been opened, the outputs will remain off, even when the EMO Switch is subsequently closed. To restore the outputs, return the EMO Switch to the closed position; then switch the Outputs Enable Switch off for at least 15 seconds and then on again. This will reset the EMO control circuit and restore the outputs.

Wiring an Emergency Shutdown Switch

The EMO Switch must be a normally-closed, press-to-open switch. Wire the switch to J2 on the Control Board as shown in Figure 9. To use multiple EMO Switches, wire them in series to J2. The EMO circuit provides 12 volts dc at 1 milliamp.

NOTE

There MUST be either a closed switch or a jumper wired to the EMO terminals (J2 pins 5–6); otherwise, the outputs cannot be turned on.

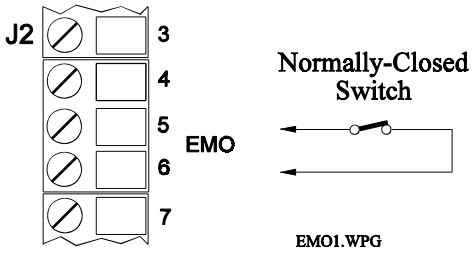


Figure 9. Wiring an Emergency Shutdown Switch

The Line Monitoring Function

As long as the Mains Disconnect Switch is closed — applying power to the Control Board — the line (ac mains) is continuously monitored by the PDU. If the line voltage exceeds the factory-set limits shown in Table 4 for more than one cycle, the Line/EMO Error Indicator will light and you will not be able to turn the outputs on. If the Voltage Selector Switch (S1) is not in the correct position (page 10), the monitoring circuit will treat it as a high- or low-line condition.

Table 4. Line Monitoring Limits at PDU Turn-on

	S1 = 115V	**S1 = 230V**	**Frequency**
Low Limit	90.5 Vac ± 3%	181 Vac ± 3%	47–63 Hz
High Limit	133.5 Vac ± 3%	267 Vac ± 3%	47–63 Hz

Line Sags and Drop-outs

If the line sags below the low limit for more than one cycle, the contactor will open and there will not be power to switched loads, and the Line/EMO Error Indicator will light. If the line subsequently returns to normal, the outputs will remain off and the Line/EMO Error Indicator will remain lit. To reset the PDU, switch the Outputs Enable Switch off for at least 15 seconds and then on again; this will restore the output.

If the line drops to zero volts for more than 10 seconds, the outputs of the PDU will come back on when power is restored. A line interrupt of less than 10 seconds is treated as a sag.

Line Surges

Once the outputs of the PDU are turned on, line surges will not affect the PDU unless they are about 20 percent over the high limits of Table 4. Then, if the surge lasts longer than one cycle, the outputs will be turned off and the Line/EMO Error Indicator will light. If the line subsequently returns to normal, the outputs will remain off and the Line/EMO Error Indicator will remain lit. To reset the PDU, switch the Outputs Enable Switch off for at least 15 seconds and then on again; this will restore the output.

The Branch Control Function

NOTE

If you are installing a single PDU, not controlling or controlled by another PDU, ignore this section. Set S2 on the Control Board to the MAIN position.

An HP E1135C PDU can be used to control one or more other HP E1135 PDUs in a hierarchy as shown on page 19. The PDUs are defined as:

Main PDU: There can be only one main PDU in a hierarchy. It controls one or more downstream branch or sub-branch PDUs, but cannot be controlled by another PDU. Set S2 on the Control Board to MAIN.

Branch PDU: There can be one or more branch PDUs. They are controlled by upstream PDUs and control downstream PDUs. Set S2 on the Control Board to BRANCH.

Sub-branch PDU: There can be one or more sub-branch PDUs. They are always at the bottom of the control path. They are controlled by an upstream main or branch PDU but cannot control another PDU. Set S2 on the Control Board to BRANCH.

If the main PDU goes off, all other PDUs go off. If a branch PDU goes off, only the branch and sub-branch PDUs below it go off; no PDUs above it are affected.

Every main, branch, and sub-branch PDU can also have its own Outputs Enable and EMO Switches. These switches are optional; you can use them if you want local control at each PDU.

To implement branch PDUs, see "Setting Up Branch PDUs" on page 19.

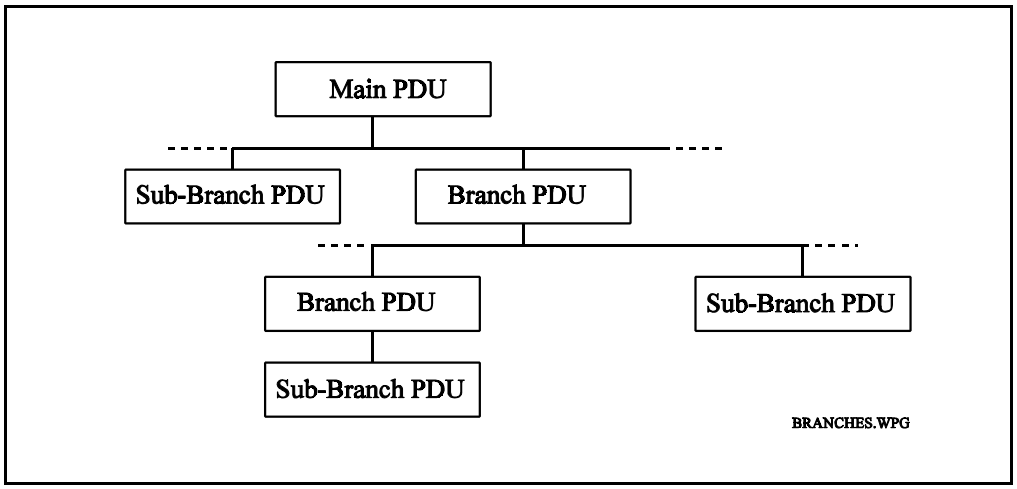


Figure 10. The Hierarchy of Main, Branch and Sub-branch PDUs

Setting Up Branch PDUs

This section describes how to connect the control wires and set the Main/Branch Switch (S2) in each PDU to set up different branch PDU configurations. Use the figure that matches your desired configuration.

To connect two or more branch or sub-branch PDUs to an upstream PDU, connect the control wires in parallel.

NOTE

Ensure that '+' terminals are only connected to other '+' terminals and '–' terminals are only connected to other '–' terminals. If a '+' and '–' terminal are connected together, the circuits will not function properly.

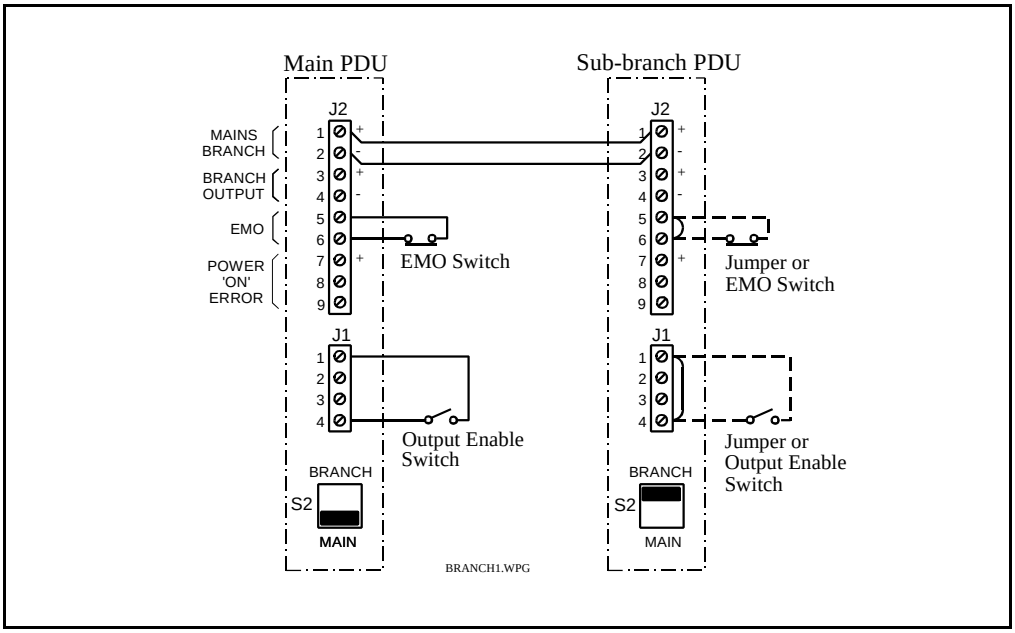


Figure 11. The Main/Sub-branch Configuration

Set-up:

- Set the main PDU to MAIN
- Set the sub-branch PDU to BRANCH
- The sub-branch PDU can have its own Outputs Enable and EMO Switches

NOTE

If the sub-branch PDU does not have its own Outputs Enable Switch or EMO Switch, then it must have jumpers wired in place of these switches. Otherwise, the outputs cannot be turned on.

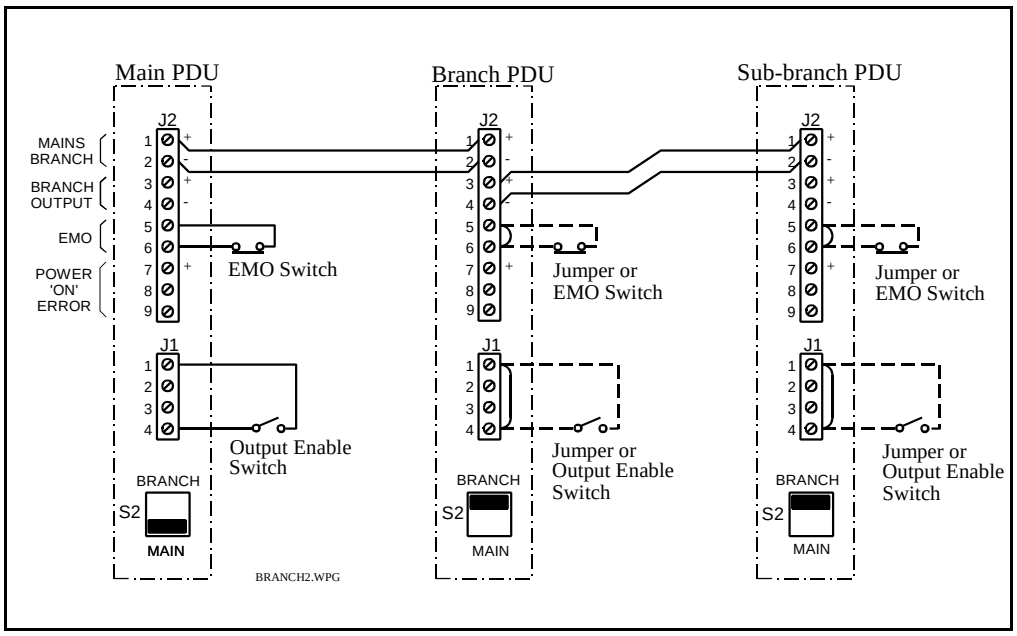


Figure 12. The Main/Branch/Sub-branch Configuration

Set-up:

- Set the main PDU to MAIN
- Set the branch PDU to BRANCH
- Set the sub-branch PDU to BRANCH
- The branch and sub-branch PDUs can have their own Outputs Enable and EMO Switches

NOTE

If the branch or sub-branch PDU does not have its own Outputs Enable Switch or EMO Switch, then it must have jumpers wired in place of these switches. Otherwise, the outputs cannot be turned on.

WIRING THE AC MAINS AND LOADS TO THE PDU

WARNING

These procedures must be performed only by trained and qualified service personnel.

To prevent the possibility of electrical shock, which could cause injury or death, connect an ac mains ground wire to the "GND" terminal of the Mains Disconnect Switch inside the PDU.

Holes are provided in the front, side and rear covers for wire egress. For safety, use strain relief cable clamps (0400-0377) on all wires. Install filler plugs (6960-0177) in all unused holes.

CAUTION

After wiring the ac mains inputs to the PDU, turn on the PDU and measure the outputs using a voltmeter to verify that they are at the expected voltage before wiring the loads.

CAUTION

For electrical safety, do not connect more than one wire to a terminal on the output terminal block. Each terminal has two terminations on the terminal block. See Figure 3, page 5.

NOTE

If you are replacing an E1131A or E1135A/B PDU, either wire it like the existing PDU, or use the documentation that came with your product. You will connect the mains to the Mains Disconnect switch instead of the input block, but the T1, T2, T3 terminals match the L1, L2, L3 terminals of the previous PDU. There are fewer terminals on the output block of the E1135C, but the labels are the same.

Stripping Wires and Torqueing Terminals

To ensure that all input and output wires are safely connected in the PDU, strip the wires and torque the terminal screws as shown in Table 5.

Table 5. Stripping and Torqueing Specifications

Terminals	Strip Wires	Torque Terminals[1]
Mains Disconnect terminals: — T1, T2, T3, NEU, GND	15 mm (0.6 in)	1.7 N-m (16 in-lb)
Input block terminals: — 10A terminals — LL1, LL2, NEU, GND	15 mm (0.6 in) 8 mm (0.3 in)	2.0 N-m (18 in-lb) 0.68 N-m (6 in-lb)
Output block terminals: — L1, L2, L3, NEU, GND	8 mm (0.3 in)	0.5 N-m (4.4 in-lb)

Tools Needed

- T10 Torx driver for removing covers (access plates)
- 1/4-inch flat blade screwdriver for connecting the ac mains
- 1/8-inch flat blade screwdriver for connecting loads

[1] Units of torque: "N-m" means newton-meters; "in-lb" means inch-pounds.

Fabricating a Jumper

Some mains configurations require that a short jumper be installed on the Mains Disconnect Switch. Fabricate a jumper from a 50-millimeter (2-inch) length of wire, sized appropriately for the load. Insert both the mains wire and the jumper wire in the same terminal on the Mains Disconnect Switch.

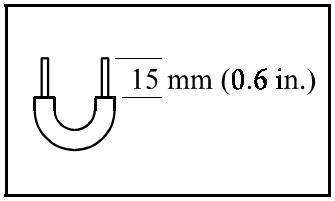


Figure 13. Jumper

120/208–240/415 V 3-Phase Wye with Neutral

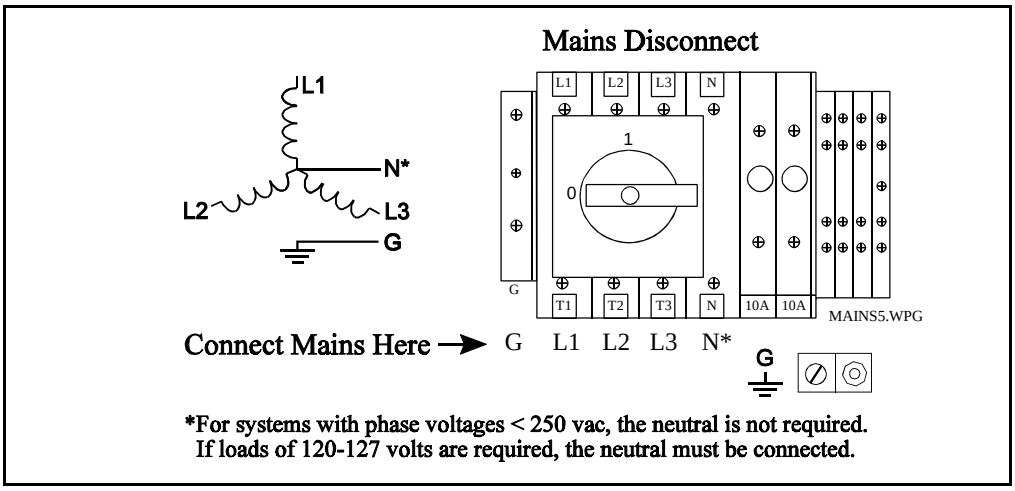


Figure 14. Wiring the Mains: 120/208–240/415 V 3-Phase Wye with Neutral

NOTE

The line-to-neutral voltage must not exceed 240 volts. The voltage between any two lines (line-to-line) may be as high as 415 volts.

Tools for connecting the mains and loads:

- 1/4-inch flat blade screwdriver for the Mains Disconnect Switch
- 1/8-inch flat blade screwdriver for the Output Terminal Block

Set the Voltage Selector Switch (S1) on the Control Board to 230V (page 9).

Wiring Loads: If the line-to-line voltage is greater than 250 volts, wire loads line-to-neutral only. If the line-to-line voltage is less than 250 volts, wire either line-to-line (full voltage) or line-to-neutral.

208 or 220 V 3-Phase Wye

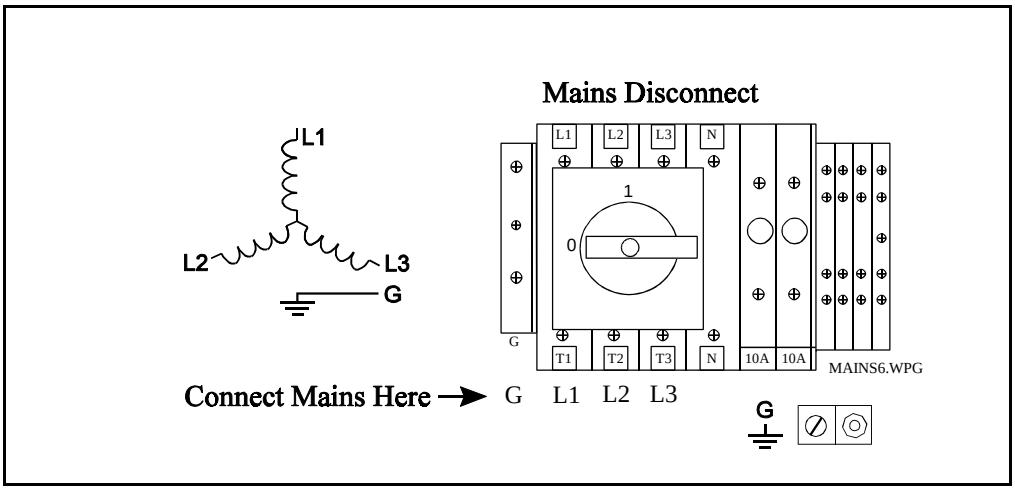


Figure 15. Wiring the Mains: 208 or 220 V 3-Phase Wye

NOTE

The line-to-line voltage must not exceed 240 volts.

Tools for connecting the mains and loads:

- 1/4-inch flat blade screwdriver for the Mains Disconnect Switch
- 1/8-inch flat blade screwdriver for the Output Terminal Block

Set the Voltage Selector Switch (S1) on the Control Board to 230V (page 9).

Wiring Loads: Wire line-to-line.

100/200–120/240 V Three-Phase Delta

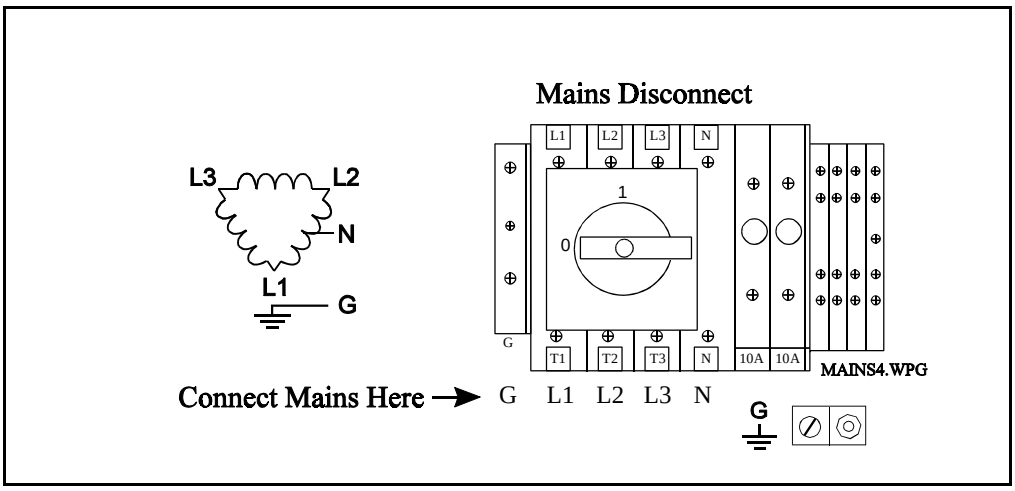


Figure 16. Wiring the Mains: 100/200–120/240 V Three-Phase Delta

Tools for connecting the mains and loads:

- 1/4-inch flat blade screwdriver for the Mains Disconnect Switch
- 1/8-inch flat blade screwdriver for the Output Terminal Block

Set the Voltage Selector Switch (S1) on the Control Board to 230V (page 9).

Wiring Loads: Wire line-to-line.

120/208–240/415 V Single-Phase Wye with Neutral

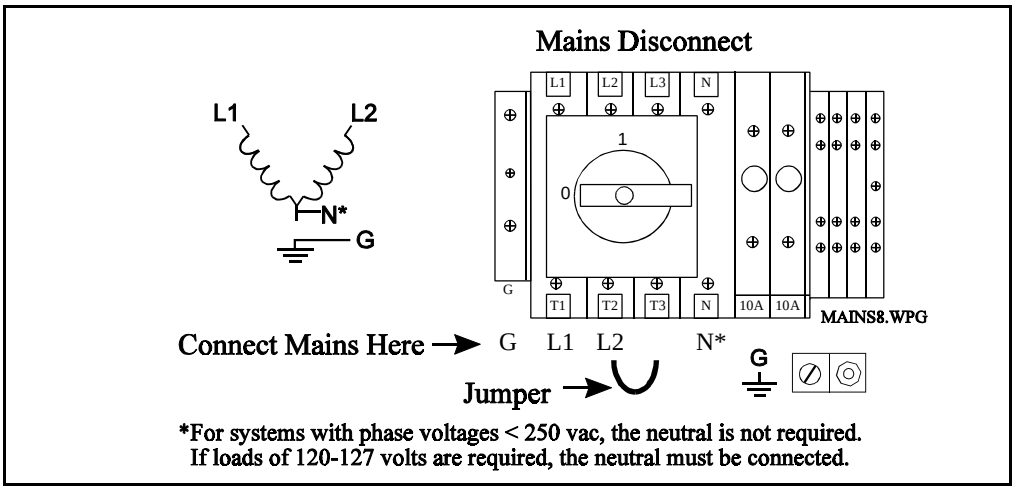


Figure 17. Wiring the Mains: 120/208–240/415 V Single-Phase Wye with Neutral

Tools for connecting the mains and loads:

- 1/4-inch flat blade screwdriver for the Mains Disconnect Switch
- 1/8-inch flat blade screwdriver for the Output Terminal Block
- wire jumper between T2 and T3 (page 24)

Set the Voltage Selector Switch (S1) on the Control Board to 230V (page 9).

Wiring Loads: If the line-to-line voltage is greater than 250 volts, wire loads line-to-neutral only. If the line-to-line voltage is less than 250 volts, wire either line-to-line (full voltage) or line-to-neutral.

100/200–120/240 V Single Phase with Center-Tap Neutral

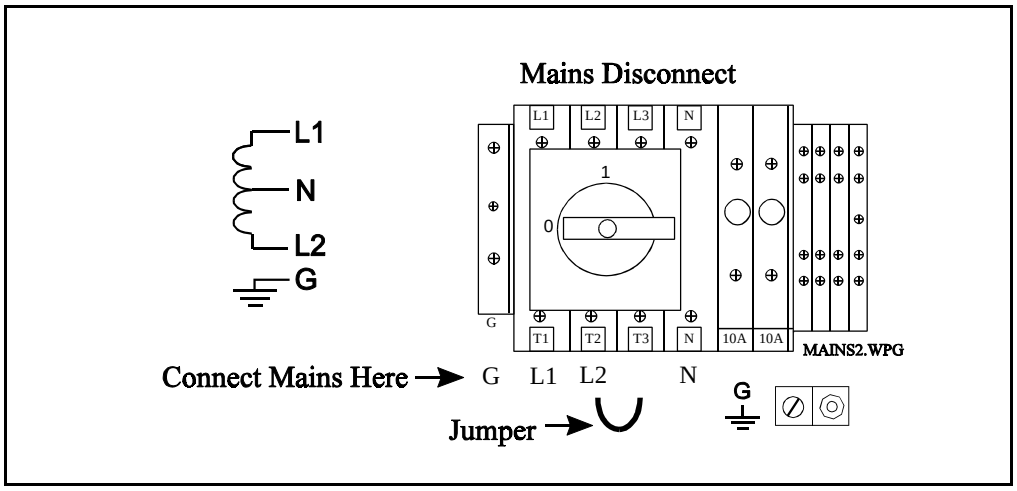


Figure 18. Wiring the Mains: 100/200–120/240 V Single Phase with Center-Tap Neutral

Tools for connecting the mains, loads and jumper:

- 1/4-inch flat blade screwdriver for the Mains Disconnect Switch
- 1/8-inch flat blade screwdriver for the Output Terminal Block
- wire jumper between T2 and T3 (page 24)

Set the Voltage Selector Switch (S1) on the Control Board to 230V (page 9).

Wiring Loads: Wire line-to-line or line-to-neutral.

200–240 V Single Phase Non-Earthed

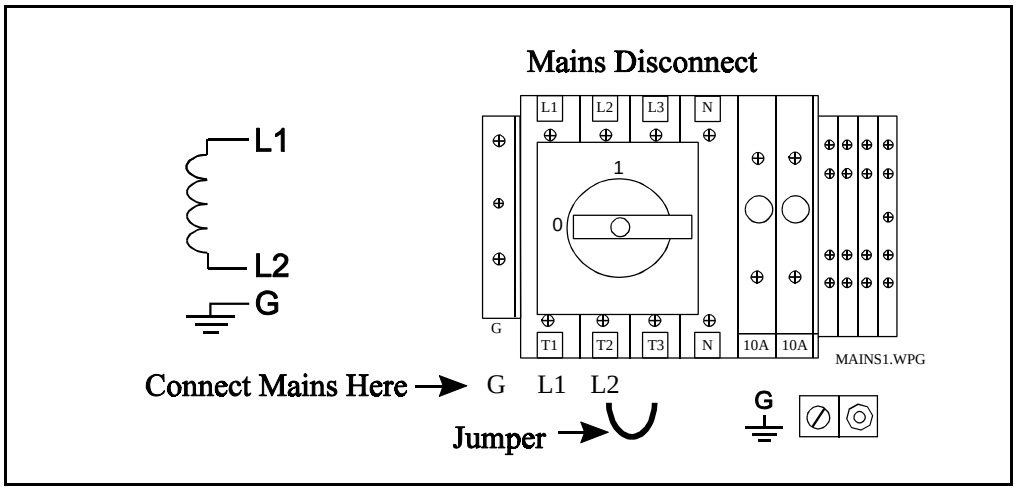


Figure 19. Wiring the Mains: 200–240 V Single Phase Non-Earthed

Tools for connecting mains, loads and jumper:

- 1/4-inch flat blade screwdriver
- 1/8-inch flat blade screwdriver
- wire jumper between T2 and T3 (page 24)

Set the Voltage Selector Switch (S1) on the Control Board to 230V (page 9).

Wiring Loads: Wire line-to-line.

100–240 V Single Phase Earthed

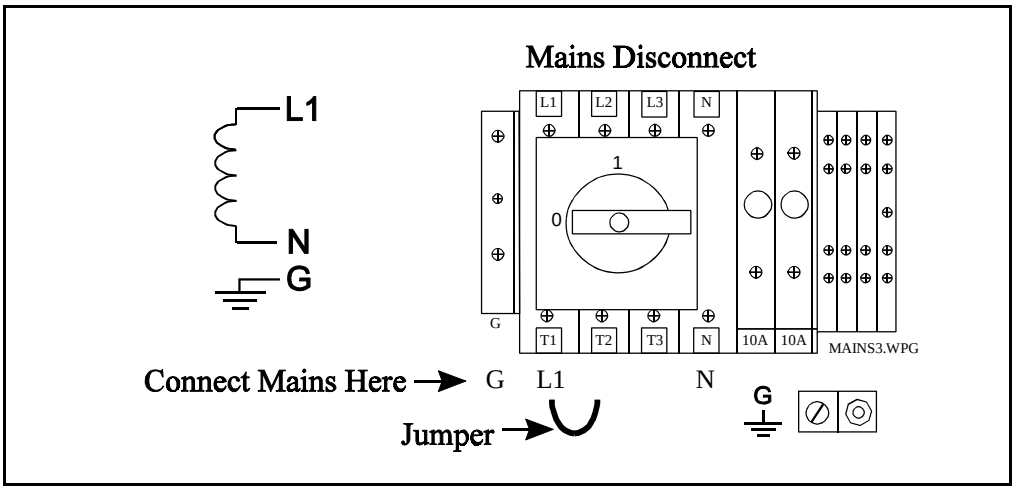


Figure 20. Wiring the Mains: 100–240 V Single Phase Earthed

Tools for connecting mains, loads and jumper:

- 1/4-inch flat blade screwdriver
- 1/8-inch flat blade screwdriver
- wire jumper between T1 and T2 (page 24)

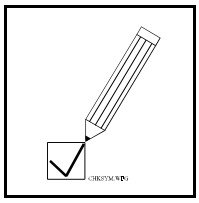
Set the Voltage Selector Switch (S1) on the Control Board to (page 9):

- 115V for 100–127 volts or
- 230V for 220–240 volts

Wiring Loads: Wire line-to-neutral. NOTE: In this configuration, no power is available from the line 03 terminals of the Output Terminal Block (see Figure 2 on page 4).

Installation / Marking the PDU

After installing the PDU in a system, check and mark the front and rear panels of the PDU as appropriate where you see this symbol. Use an indelible felt-tip marker. Marks can be removed using isopropyl alcohol.



Connecting a Pigtail to the E1135C PDU

The E1135C PDU is the replacement for the E1131A, and E1135A/B PDUs. The input terminals on the E1135C on the mains disconnect switch easily fit wire size 10 square millimeters (#8 AWG). It is strongly suggested that if the recommended wire size in the following is greater than 10 square millimeters (#8 AWG, that an 450 millimeters (18-inches) to 609 millimeters (24-inches) pig tail be created using 10 square millimeters (#8 AWG) wire, and the recommended larger cable be connected to the pigtail as shown in Figure 21.

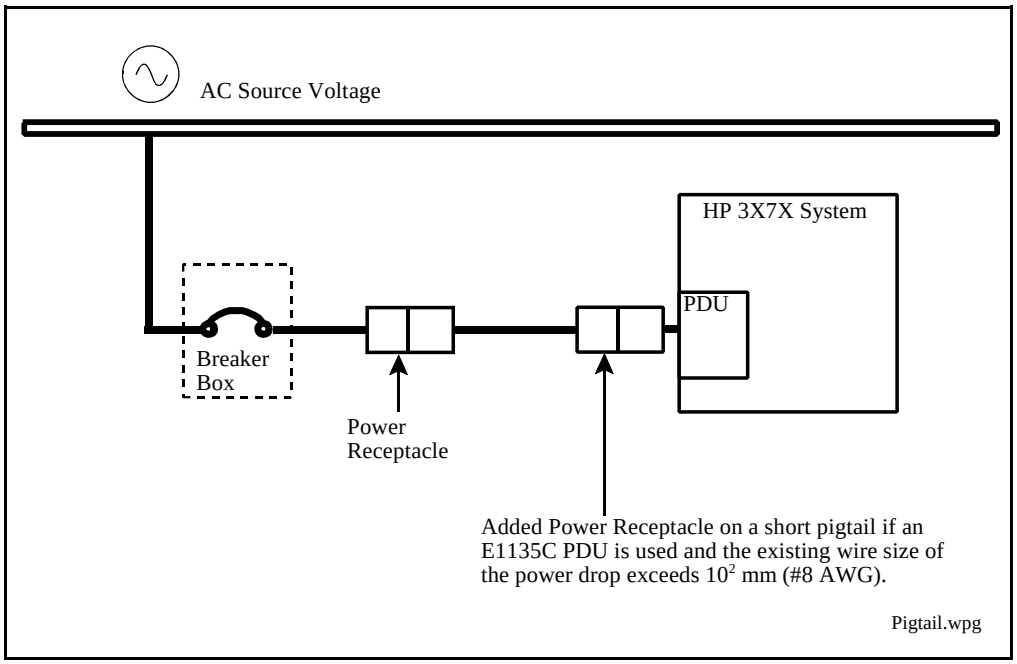


Figure 21. Using a Pigtail with the E1135C PDU

SERVICE INFORMATION

WARNING

There are no user-serviceable parts inside the PDU. Refer servicing to trained service personnel.

AVERTISSEMENT

Ne contient pas d'élément que l'untilisateur puisse réparer. Confier la maintenance à un technicien qualifié.

WARNING

Hazardous voltages, capable of causing injury or death, are present inside the PDU. Switch the Mains Disconnect to the Off position before removing any cover from the PDU. Even with the Mains Disconnect Switch off, if the PDU is not unplugged from the mains, hazardous voltage is still present on the T1, T2 and T3 terminals of the Mains Disconnect Switch. These procedures must be performed only by trained and qualified service personnel.

Repair Strategy

The HP E1135C PDU is not intended for component-level repair. If a repair involves more than resetting a circuit breaker or replacing a blown (open) fuse, order a replacement PDU from HP. The PDU is available in different configurations, so consult your HP representative. The Parts List on page 38 includes covers and miscellaneous hardware that can be replaced or added to the PDU.

Troubleshooting From the LED Indicators

By observing the two LED indicators and the Outputs Enable Switch lamp, and observing PDU operation, you can troubleshoot PDU problems. Table 6 assumes that the Outputs Enable Switch is in the On position.

Table 6. Troubleshooting From the LEDs

Yellow LED	Green LED	Switch Lamp	Switched Outputs	Problem
OFF	OFF	OFF	OFF	No line voltage (mains) is present
OFF	OFF	ON	OFF	Yellow LED is open
OFF	ON	OFF	ON	Outputs Enable Switch lamp is open
OFF	ON	ON	ON	NORMAL OPERATION
ON	OFF	OFF	OFF	Line voltage went greater then 135/270 Vac (surge) or S1 is set to the wrong position
ON	OFF	ON	OFF	Line voltage went less than 85/170 Vac (sag) or S1 is set to the wrong position
ON	ON			Invalid state; Control Board failure

If the outputs of the PDU are being switched off often due to sags (low-line conditions), you should take action to correct the mains. One source of information that explains how to reliably measure the mains and correct low-line problems is a power primer called *Why Peak Measurements are More Reliable then RMS Measurements* (HP E4000-90037, December 1995), available through your HP representative.

Troubleshooting From Symptoms

No Power From the Output Terminals

Check:

- Mains connected to the input
- Mains Disconnect Switch
- Outputs Enable Switch
- Emergency Shutdown (EMO) switch
- Circuit breakers
- Voltage Selector Switch (S1)
- Main/Branch Switch (S2) or connections

No Power From the Outlets

Check:

- Mains connected to the input
- Mains Disconnect Switch
- 10 AF 250 V fuses (2110-0051) on the input terminal block (see "Fuses" below) *
- See "No Power From the Output Terminals **

* If the outlets are wired for un-switched operation

** If the outlets are wired for switched operation

Branch Control Does Not Work

Check:

- Main/Branch switch (S2) set incorrectly (page 19).
- Branch In/Out terminals not wired with the correct polarity (page 19).

Fuses

The un-switched power fuses (10 AF, 250 V, Part Number 2110-0051) are located on the terminal block next to the Mains Disconnect Switch as shown in Figure 22.

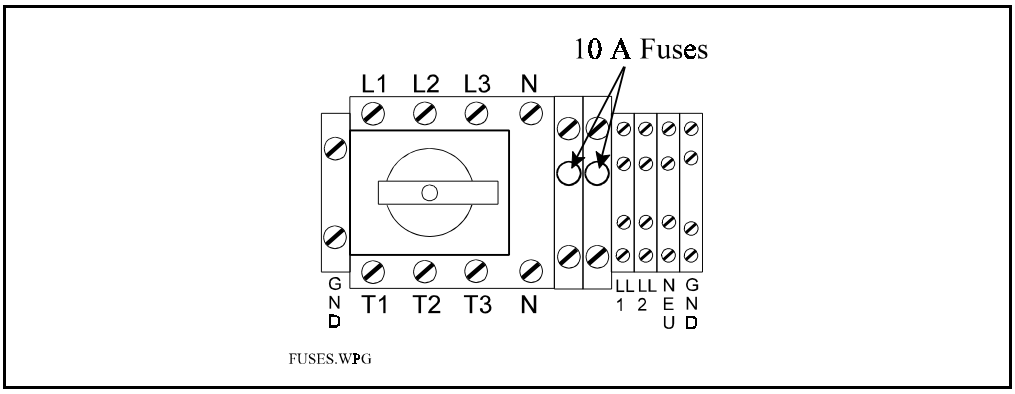


Figure 22. HP E1135C PDU Fuse Locations

CAUTION

Exercise care when screwing in the fuse holders. The threads are fine and it is easy to cross-thread or strip them.

Circuit Breakers

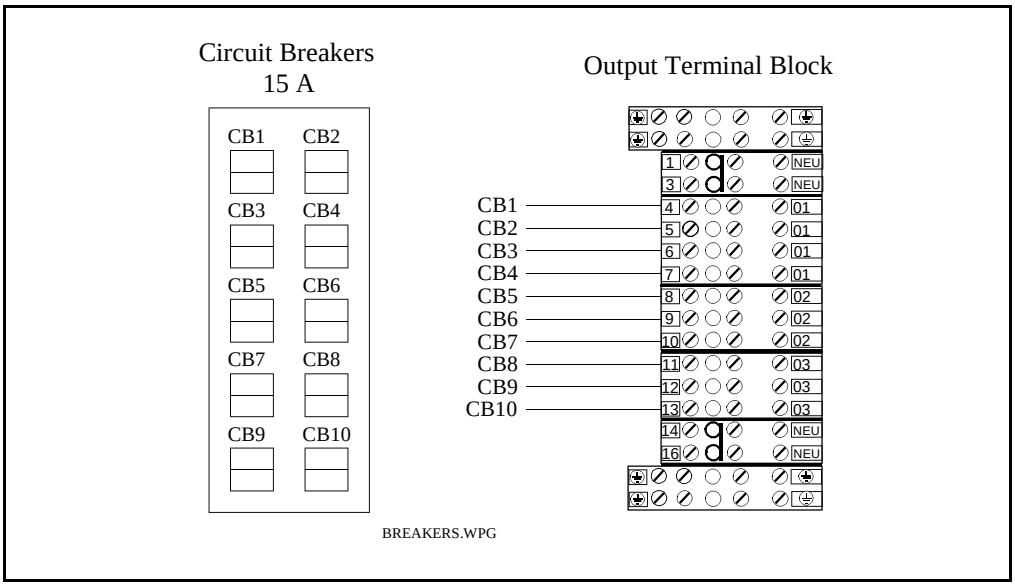


Figure 23. Circuit Breaker-to-Switched Output Mapping

CAUTION

These circuit breakers are not switches. Any attempt to switch them off will result in permanent damage to the breakers.

Parts List

For part numbers of a replacement PDU, see page 12.

Chassis Parts:

Cover, right front (output terminal block)	E1135-00151
Cover, left front (input)	E1135-00152
Cover, top	E1135-00153
Cover, rear	E1135-00254
Screw, M3.5 x 8, T10 Torx, for covers	0515-0387

Internal Parts:

Cable clamp, plastic	0400-0377
Fuse, 10 AF, 250 V	2110-0051
Hole filler plug	6960-0177
Screw, M3.5 x 6, flat head, T10 Torx	0515-1604