

PowerStruXure User's Manual

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Safety Information

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Safety Warnings

This manual is intended for use by the following groups:

- Users
- Licensed electricians
- APC Field Service Engineers
- Qualified, APC-trained personnel

This manual indicates who must perform specific procedures. Failure to follow the instructions in this manual could result in damage to property, personal injury, or even death.s

Safety symbols used in this guide



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



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



Indicates important information.



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

General safety warnings



IMPORTANT SAFETY INSTRUCTIONS

Save these instructions. This manual contains important instructions that should be followed during installation and maintenance of the PowerStruXure system.

INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ

Conserver ces instructions. Cette notice contient des instructions importantes concernant la sécurité.



Note

Total Power Off Procedure:

1. Set the Symmetra 3-Phase UPS System Enable switch to the Standby or Off position.
2. Open the Symmetra 3-Phase UPS DC Disconnect breaker.
3. Open the PDU with System Bypass Main Input breaker.
4. Open the DC Disconnect breaker of each XR Battery Cabinet.
5. Disconnect the batteries in the Symmetra 3-Phase UPS by pulling them out approximately one inch (25.4 mm) from their normal position.



Electrical Hazard

Hazardous, live parts inside the Symmetra 3-Phase UPS are energized from the battery supply even when the AC power is disconnected.

Hazardous, live parts may exist inside the PDU with System Bypass due to the Symmetra 3-Phase UPS inverter even when the AC power is disconnected. Test before touching any electrical parts.



Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

PDU with System Bypass



Electrical Hazard

Hazardous, live parts inside the PDU with System Bypass are energized from the battery supply of the attached Symmetra 3-Phase UPS even when the AC power is disconnected.

Risk of Electrical Shock. No user serviceable parts inside. Refer all servicing to an APC Field Service Engineer.

A licensed electrician must perform the following:

- Connection to the branch circuit.
- Connection of PDU power cords in addition to the factory-installed power cords.



Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The Branch Circuit conductors are secured to the Main Input Circuit Breaker. Ensure that the circuit breaker terminals are tightened to the torque specified on the circuit breaker's label.



This product is intended for installation in a temperature-controlled (0° C–40° C), indoor area, free of conductive contaminants.

Symmetra 3-Phase UPS



The Symmetra 3-Phase UPS contains an internal energy source. Hazardous voltage can be present even when disconnected from the utility power source.

All power wiring from the Symmetra 3-Phase UPS to the PDU with System Bypass must be completed by an APC Field Service Engineer.

A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove all conductive jewelry such as chains, watches, and rings.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of the batteries.



When replacing batteries, replace with same number and type as installed. For customer-supplied external batteries, see manufacturer's installation and safety instructions.

Other components

Automatic Transfer Switch, Metered Rack-Mount PDU, Information Controller, and Information Controller Hub.



This equipment contains potentially hazardous voltages. Do not attempt to disassemble the unit.

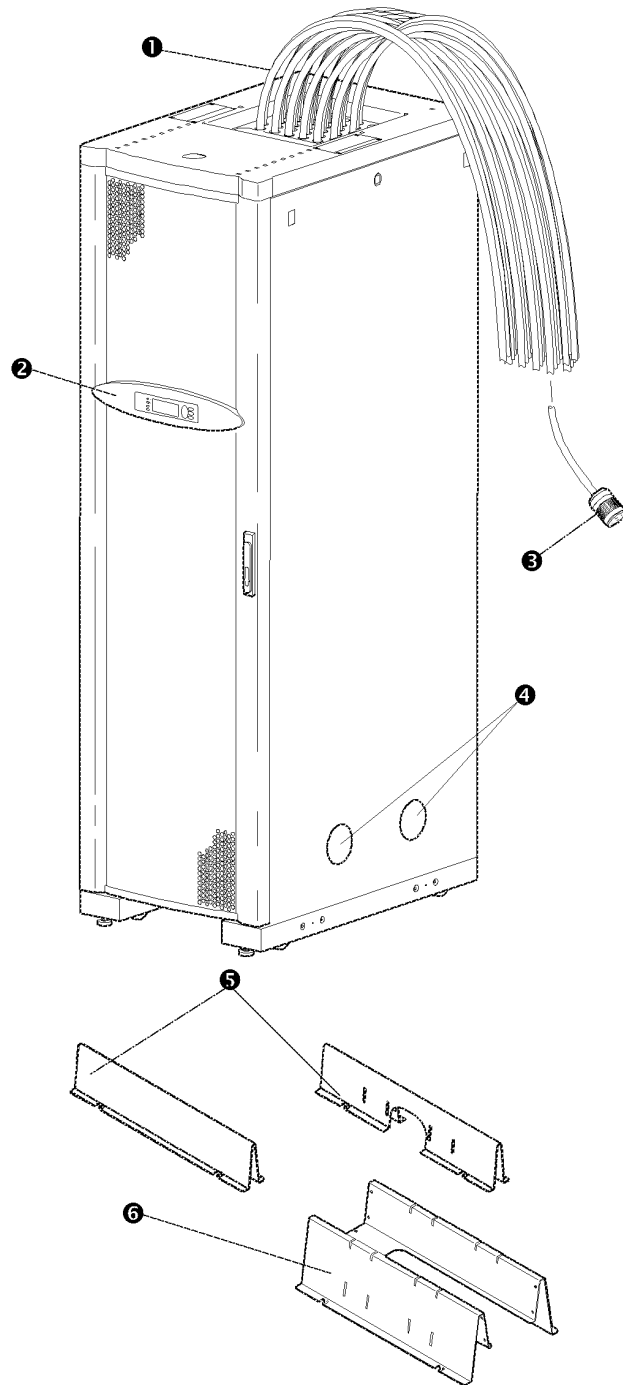
This equipment contains no user serviceable parts. Repairs are performed only by factory-trained service personnel.

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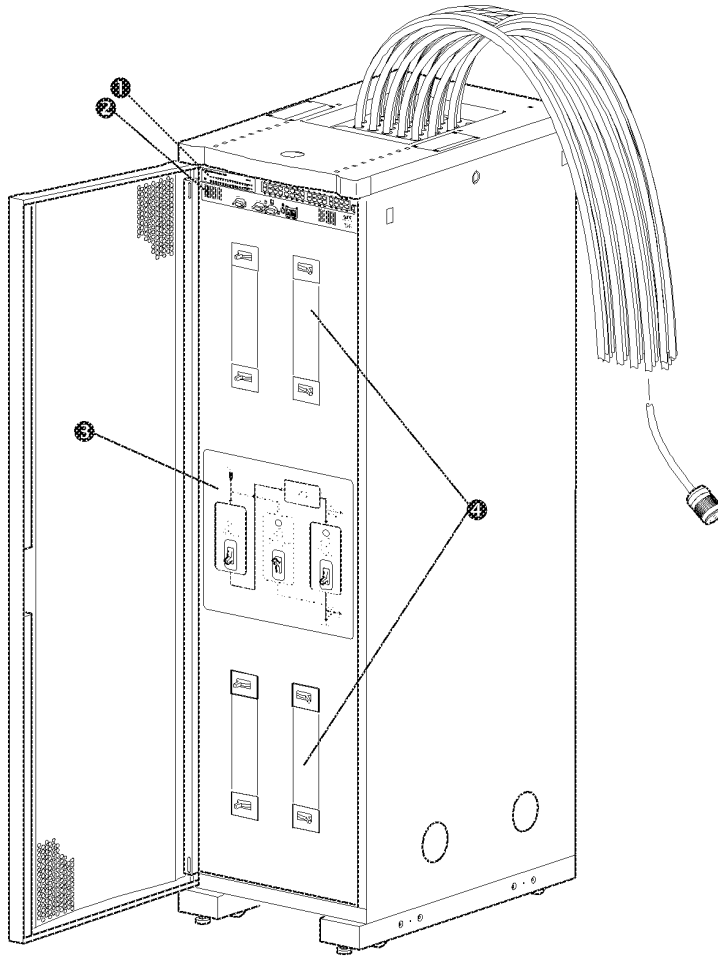
PDU with System Bypass

Front view



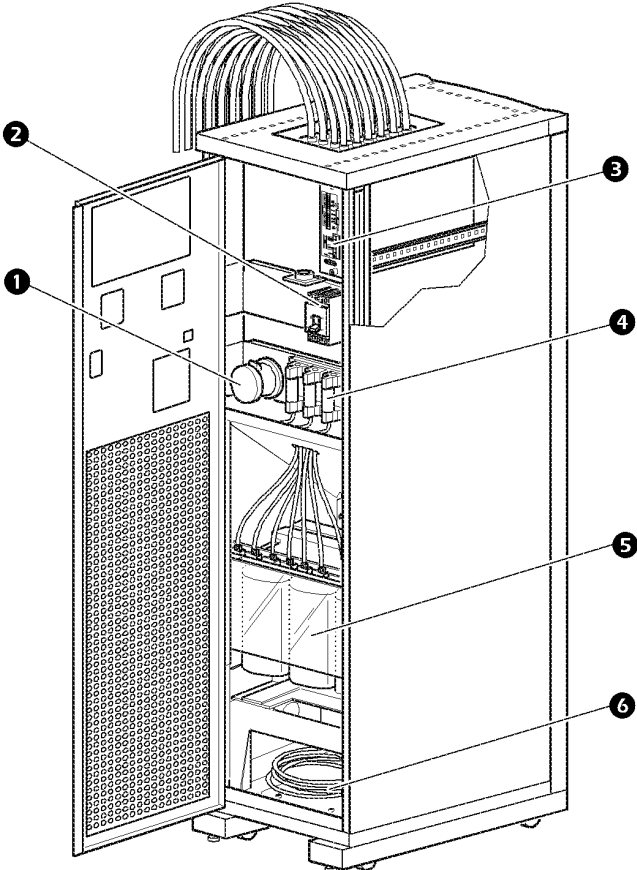
- | | |
|----------------------|----------------------|
| ❶ Power cable (whip) | ❷ Cable access holes |
| ❸ Display interface | ❹ Power cable trough |
| ❺ L21-20 outlet | ❻ Data cable trough |

Front view (interior)



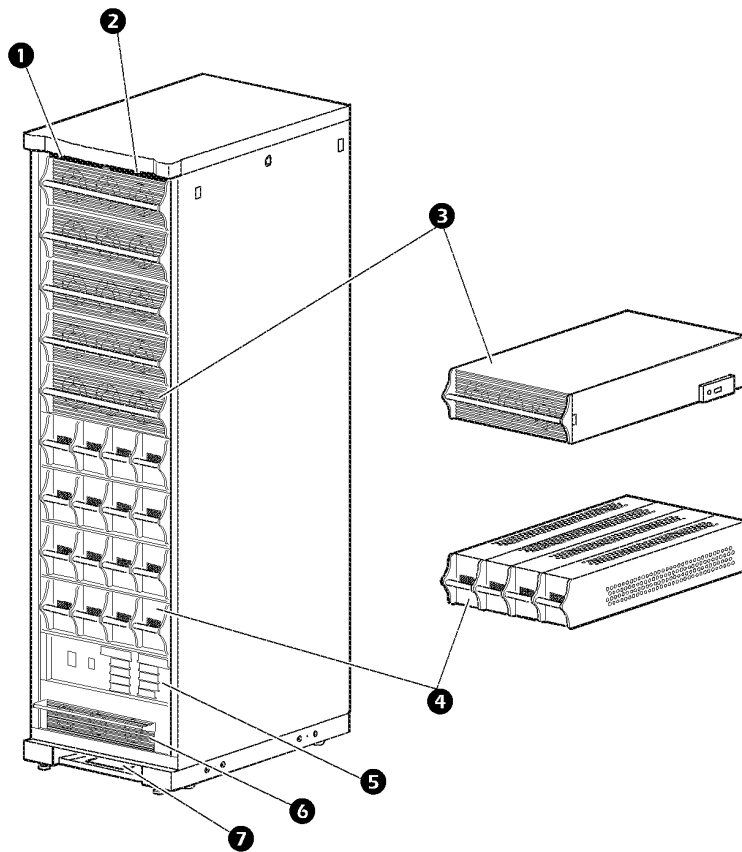
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| ❶ Information Controller Hub | ❸ Wraparound maintenance bypass panel |
| ❷ Information Controller | ❹ 42-position circuit breaker panels |

Rear view (interior)

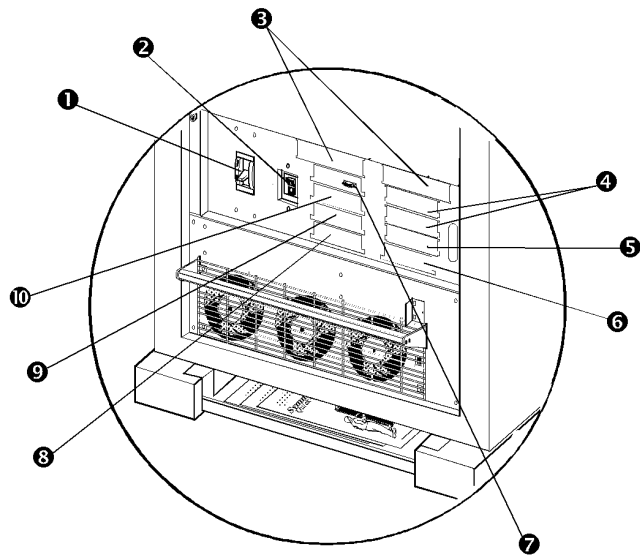


- ❶ Load test bank connector
- ❷ Main input breaker
- ❸ PDU monitoring unit
- ❹ Fuses for external static switch
- ❺ PDU transformer
- ❻ EPO switch interface
- ❼ UPS input and output connector cables

Symmetra PX UPS



- ❶ Main intelligence module (MIM)
- ❷ Redundant intelligence module (RIM)
- ❸ Power module
- ❹ Battery module (four battery units)
- ❺ Access for data cables
- ❻ Static switch module
- ❼ Documentation tray

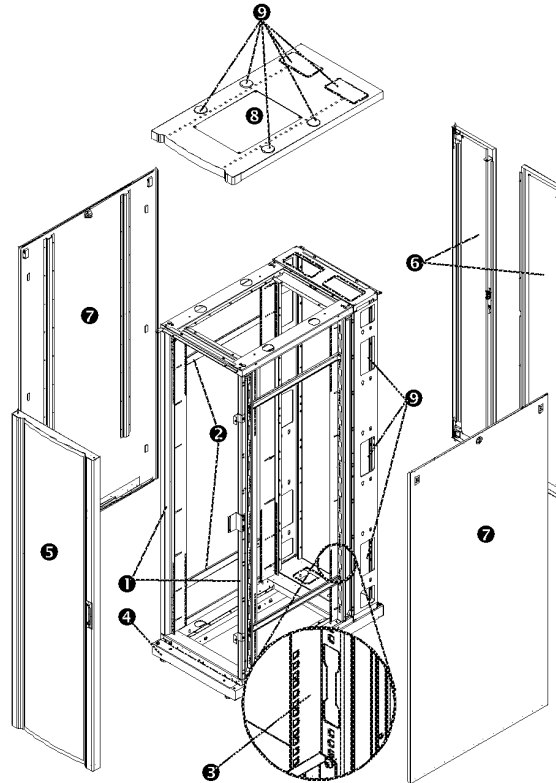


- | | | | |
|---------------------------|--|---------------------------|-----------------------------------|
| ❶ DC disconnect breaker | ❸ System power supply cards | ❹ Available card slots | ❺ Network Management Card |
| ❷ System-enable switch | ❶ External switch gear monitoring card | ❸ Reserved for future use | ❷ Display/computer interface card |
| ❸ Battery monitoring card | ❷ Extended-Run Frame card | | |

NetShelter VX Enclosures

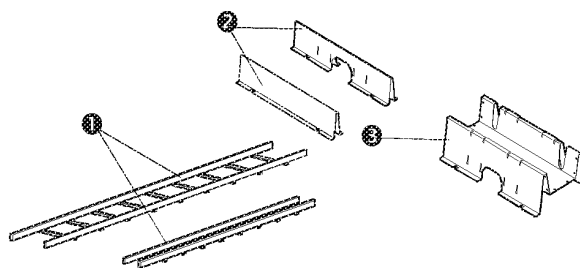
The APC Netshelter® VX enclosure allows 42U (73.50 in) of storage height for EIA-310, 19-inch, rack-mount equipment. It comes in two models:

- AR2100BLK—the base enclosure
- AR2101BLK—an expansion enclosure



- | | |
|--------------------------------|--|
| ❶ Frame posts | ❹ Access on roof, sides, and base |
| ❷ Adjustable horizontal braces | ❺ Quick-release side panels with locks (base model only) |
| ❸ Vertical mounting rails | ❻ Ventilated split rear door for added access in narrow aisles |
| ❹ Skirt | ❼ Quick-release, ventilated, reversible front door |

Cable-routing equipment



- ❶ Overhead ladders
- ❷ Data partitions
- ❸ Power cable trough

NetShelter VX options

Options for this enclosure include the following:

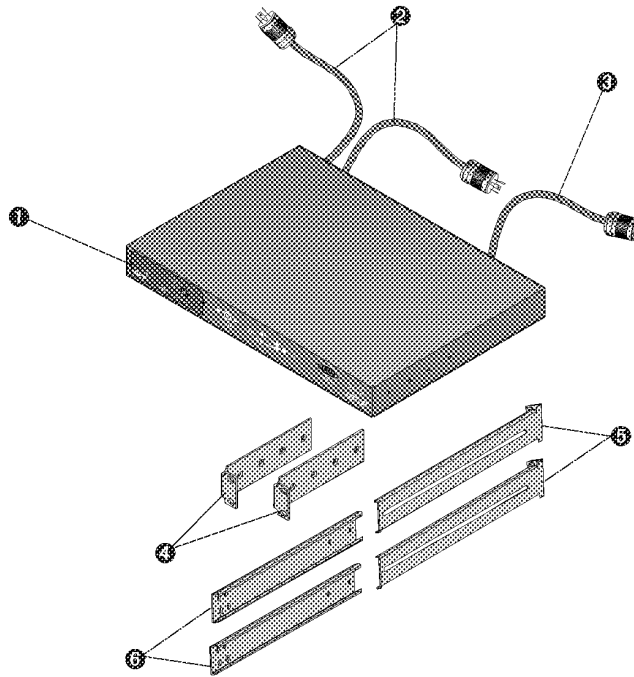
- Stabilizer plate
- Bolt-down brackets
- Cable management devices
- Toolless mounting for some accessories

Expansion and mounting hardware

Item	Quantity	
	AR2100BLK	AR2101BLK
Expansion hardware		
Baying brackets	–	4
Vertical baying trim	–	1
M6 x 12 socket-head screws	–	8
M6 caged nuts	–	8
Mounting hardware		
M6 × 16 mm Phillips/slotted screws	60	60
Caged nut installation tool	1	1
M6 caged nuts	60	60
Plastic cup washers	60	60
Open-ended wrench (13/14 mm)	1	1
M5 Allen wrench	1	1
Door/side panel keys	2	2

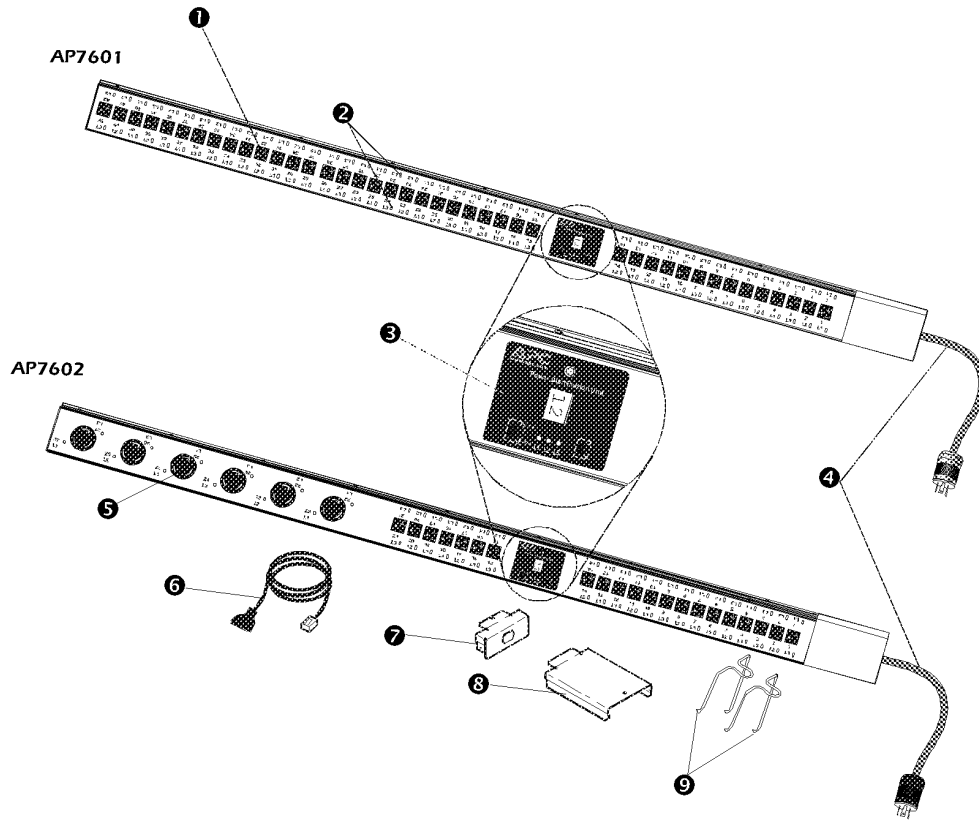
3-Phase Automatic Transfer Switch

AP7701



- ❶ Network Management Card (AP9617)
- ❷ Two NEMA L21-20 plugs (cords: 36 inches)
- ❸ NEMA L21-20R receptacle (cord: 36 inches)
- ❹ Rack-mount brackets
- ❺ Rear rail segments
- ❻ Front rail segments

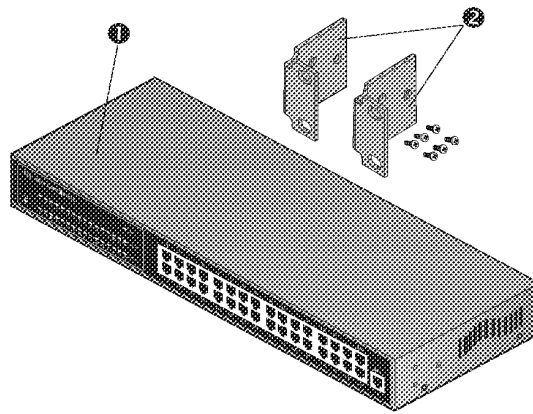
Metered Rack-Mount PDU



- | | | | |
|---|---------------------------|---|---|
| ❶ | NEMA 5-20R outlets | ❸ | Digital display |
| ❷ | Cord retention clip holes | ❹ | L21-20 power cord |
| ❸ | Digital display | ❺ | NEMA L6-20R outlets |
| ❹ | L21-20 power cord | ❻ | Serial cable (940-0144) |
| ❺ | NEMA L6-20R outlets | ❼ | Hardwire end cap (870-70803) |
| | | ❽ | Hardwire access cover (870-70804) |
| | | ❾ | Cord retention clip—AP7601:42;
AP7602:21 (870-70945) |

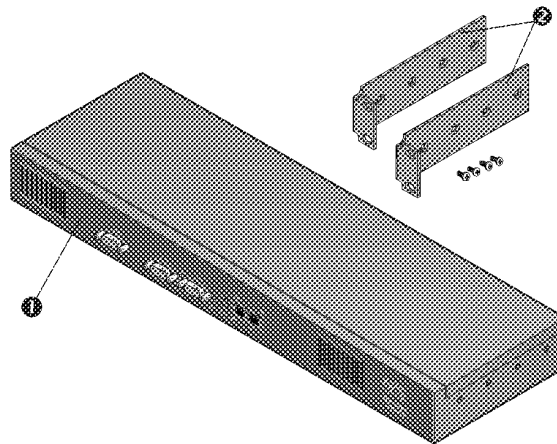
Information Controller and Hub

Information Controller Hub



- ❶ Information Controller Hub (32-port hub)
- ❷ Rack-mount brackets (2) and screws (6)

Information Controller



- ❶ Information Controller
- ❷ Rack-mount brackets (2) and screws (4)



Note

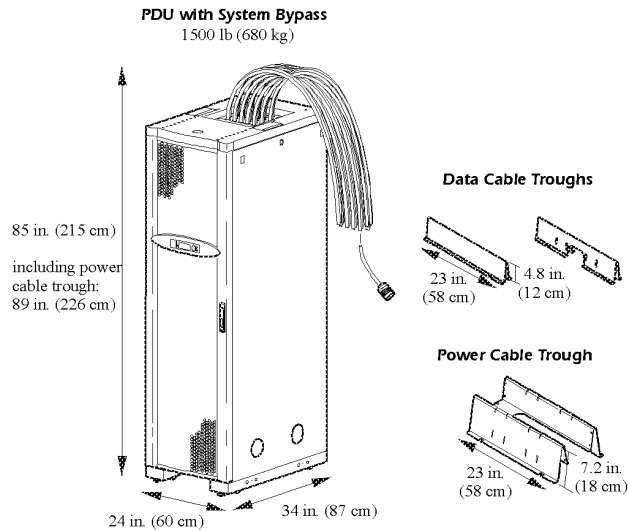
The Information Controller and the Information Controller Hub connect to powercords pre-installed in the PDU. These cords are a 5-15 to IEC C13 and an IEC C13 to an IEC C14.

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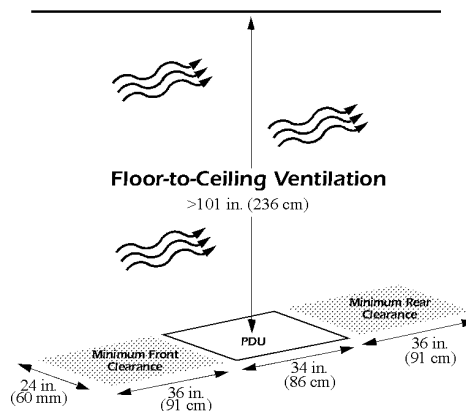
PDU with System Bypass

Weight/Dimensions



Space considerations

Study the figure below to determine your space requirements for installing the PDU with System Bypass. The clearances listed below are required to comply with Table 110-26 of the 1999 National Electric Code. In accordance with section 110-26 of this code, the 36-inch depth is required for all 120/208V products and the majority of 277/480V and 346/600V products. If 277/480V and 346/600V products are installed adjacent to an uninsulated concrete wall, you must have a working depth space of 42 inches. Consult your local code for additional requirements.



Weight considerations

Ensure that the floor and sub-floor can support the total weight of the configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements prior to installing equipment.

PDU with System Bypass Weight: 1500 lb (680 kg)

See “Weight considerations” on page 25 and on page 27 for weight measurements for the Symmetra 3-Phase UPS and NetShelter VX enclosures.

BTU Considerations

Consider the BTU ratings of equipment to determine cooling requirements. Additional cooling equipment may be required. Refer to the table below for BTU output of the PDU with System Bypass.

Product Voltage	BTU Output
208 V	4645
480 V	4617
600 V	3425

BTU was calculated with the following formula:

$$[(\text{Load} \times \% 2 \times \text{Mfg. specified load loss}) + \text{Mfg. specified core loss}] \times 3.414$$

This calculation is based on the following Square D transformers:

- 208 V: 60T211HCUOCSW3
- 480 V: 60T3HCUOCSW3
- 600 V: 60T65HCUOCSW3



Note

The BTU output is higher while batteries are charging. Under normal operating conditions, battery recharge periods are relatively infrequent.

Operating conditions

PDU with System Bypass	
Operating environment	Protected from water and conductive contaminates
Temperature class (transformer)	Class H 220° C
Storage elevation (for shipping by air)	33,000 ft (10 000 m)
Relative humidity (for operating and storage)	95% non-condensing
Operating temperature	32–104° F (0–40° C)
Acoustic noise emission	Maximum 50 dB(A) at 1 m

Electrical requirements



All power wiring, including connection to the branch circuit, must be installed by a qualified electrician and must comply with local and country codes.

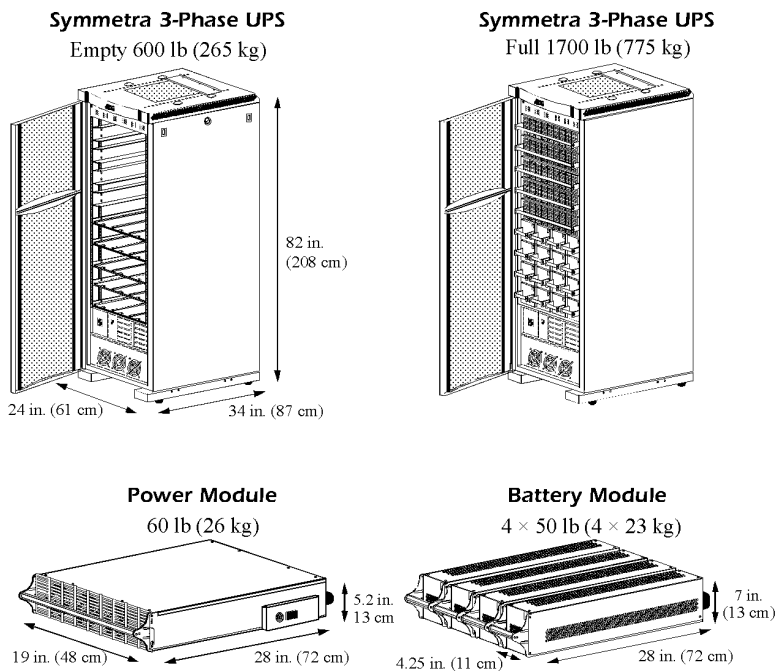
	208 V	480 V	600 V
Service distribution breaker (provided by customer)	200 A	100 A	80 A
Conductors to main input breaker (provided by customer)	3/0 conductors	#3 conductors	#4 conductors

Electrical specifications

	208 V	480 V	600 V
Transformer type	Isolation	Step-down	Step-down
Transformer configuration	Delta to WYE	Delta to WYE	Delta to WYE
Voltage requirements, nominal	208/120 V	208/120V	208/120V
Frequency	57–63 Hz	57–63 Hz	57–63 Hz
Input voltage AC	3-phase 3-wire plus ground, 208V	3-phase 3-wire plus ground, 480V	3-phase 3-wire plus ground, 600V
Output voltage AC	3-phase 4-wire plus ground, 120/208V	3-phase 4-wire plus ground, 120/208V	3-phase 4-wire plus ground, 120/208V
Output rating (full load)	40 kW	40 kW	40 kW
Maximum continuous input current (at minimum mains)	155 A	67 A	54 A
Maximum continuous output current + 125% overload (Bypass mode only)	139 A	139 A	139 A
Output current, nominal	111 A	111 A	111 A
Input current, nominal	125 A	54 A	43 A
Internal static switch fuses	175 A	175 A	175 A
External output breaker	150 A	150 A	150 A

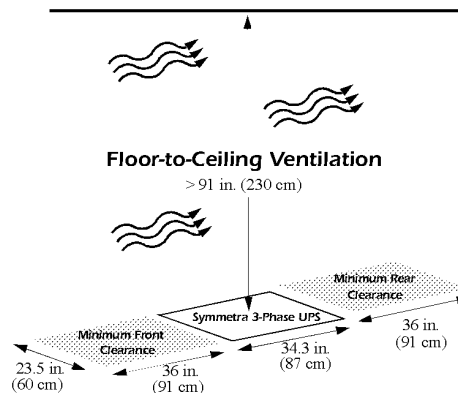
Symmetra 3-Phase UPS

Weight/Dimensions



Space considerations

Study the figure below to determine your space requirements for installing the Symmetra 3-Phase UPS. The clearances listed below are required to comply with Table 110-26 of the 1999 National Electric Code. In accordance with section 110-26 of this code, the 36-inch depth is required for all 120/208V products and the majority of 277/480V and 346/600V products. If 277/480V and 346/600V products are installed adjacent to an uninsulated concrete wall, you must have a working depth space of 42 inches. Consult your local code for additional requirements.



Weight considerations

Ensure that the floor and sub-floor can support the total weight of the configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements prior to installing equipment.

Symmetra 3-Phase UPS Weight: 1700 lb (775 kg)

See “Weight considerations” on page 21 and on page 27 for weight measurements for the Power Distribution Unit and NetShelter VX enclosures.

BTU Considerations

Consider the BTU ratings of equipment to determine cooling requirements. Additional cooling equipment may be required. BTU output of the Symmetra 3-Phase UPS is: 12,682 BTU/hr (North America)



Note

The BTU output is higher while batteries are charging. Under normal operating conditions, battery recharge periods are relatively infrequent.

Operating conditions

Symmetra 3-Phase UPS	
Temperature range	32–104°F (0–40°C)
Relative humidity	< 95%
Maximum elevation	0–10,000 ft (0–3048 m)
Nominal full load	12,682 BTU/h
Full load loss at nominal mains	3716 W
Operating environment	Keep ventilated; keep dust and corrosive fumes away from the Symmetra 3-Phase UPS.

Electrical Requirements



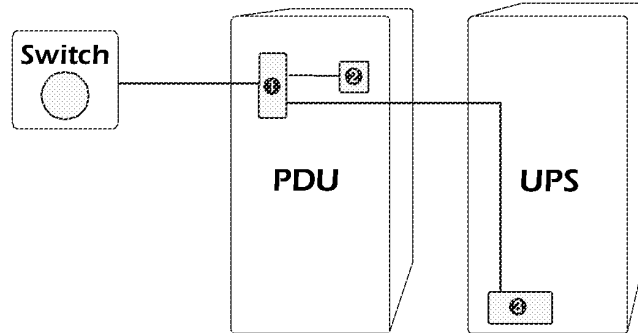
Power wiring must be installed by an APC Field Service Engineer.

Input voltage AC, nominal	3-phase 208 V
Output voltage AC, nominal	3-phase 208 V
Full load output rating (in maximum configuration)	40 kW
Input frequency	60 Hz
Output frequency	Synchronized to mains in normal operation; 60 Hz in battery operation.
Maximum input current	140 A
Maximum output current (125% load—Bypass mode only)	139 A
Output current per phase, nominal	111 A
Output per neutral, nominal (APC recommends the neutral to be 2 × phase.)	192 A
Input current, nominal	123 A
Input current limit	162 A

Emergency Power-Off Switch

Overview of EPO

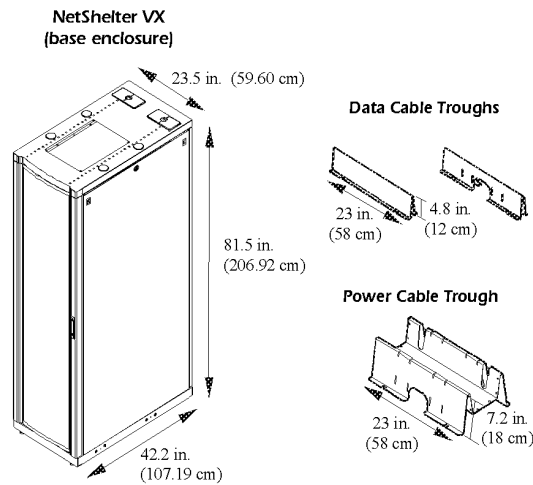
A remote switch (not included) is attached at the EPO interface in the PDU with System Bypass. The EPO interface ❶ is connected to the PDU with System Bypass Main breaker ❷ and to the Symmetra 3-Phase UPS internal EPO switch ❸ (connection to the Symmetra 3-Phase UPS is made during installation of PowerStruXure). When the remote EPO Switch is enabled, power will be terminated at the PDU with System Bypass and the Symmetra 3-Phase UPS, providing a single point for emergency shutdown of the PowerStruXure system.



NetShelter VX Enclosures

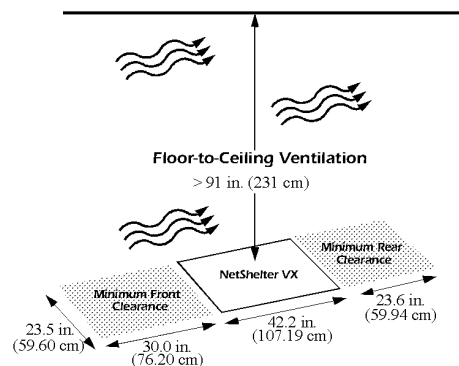
Weight/Dimensions

The American Power Conversion (APC) NetShelter[®] VX is a high-quality enclosure for storage of industry-standard (EIA-310) 19-inch equipment, which includes servers, voice, data, networking, internetworking, and APC power protection equipment. Both the base enclosure (AR2100BLK) and the expansion enclosure (AR2101BLK) provide 42U of mounting space.



Space considerations

Study the figure below to determine your space requirements for installing NetShelter VX enclosures.



Weight considerations

Ensure that the floor and sub-floor can support the total weight of your system configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements prior to installing equipment.

Enclosure weight (empty): 359 lb (162.8 kg)

The rack is rated at 2000 lb for a static load, and 1400 lb for a dynamic load. See “Weight considerations” on page 21 and on page 25 for weight measurements for the PDU with System Bypass and the Symmetra 3-Phase UPS.

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PDU with System Bypass

Tools required

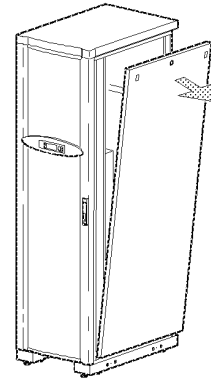
The following table lists all tools required for installation if your configuration places the PDU with System Bypass adjacent to the Symmetra 3-Phase UPS. For an installation in which the PDU with System Bypass is not adjacent to the Symmetra 3-Phase UPS, you will also need a selection of tools that are part of a standard electrician's tool set.

Tool Required	Supplied?
Standard screwdriver	No
Phillips screwdrivers (various sizes)	No
Metric socket wrench (13 mm) or adjustable open-ended wrench, for connecting input and output wires between the PDU with System Bypass and the UPS	No
Hex driver (3/16 in.)	No
Level	No
Open-ended wrench (14 mm) for adjusting the leveling feet of the PDU with System Bypass	Yes
17 mm socket wrench	No

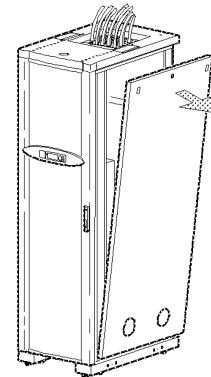
Exchange side panels

Before installing the PDU with System Bypass and the Symmetra 3-Phase UPS, you will need to exchange side panels so that the adjacent panels will have matching holes for joining the enclosures together and for routing input and output wiring between them. Perform these steps before moving the enclosures to adjacent positions.

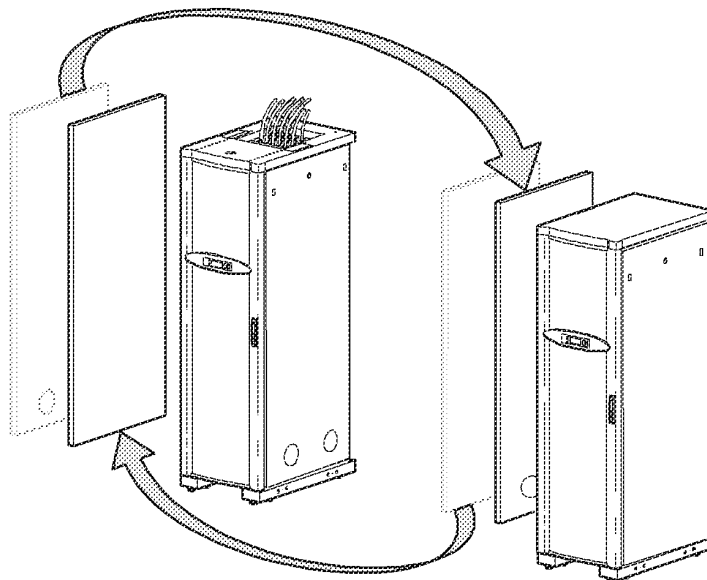
1. Remove the side panel from the side of the Symmetra 3-Phase UPS that will be adjacent to the PDU with System Bypass in your planned configuration. (For instructions on removing side panels, see “How to remove and install the side panels” on page 131.)



2. Remove the side panel from the side of the PDU with System Bypass that will **not** be adjacent to the Symmetra 3-Phase UPS.

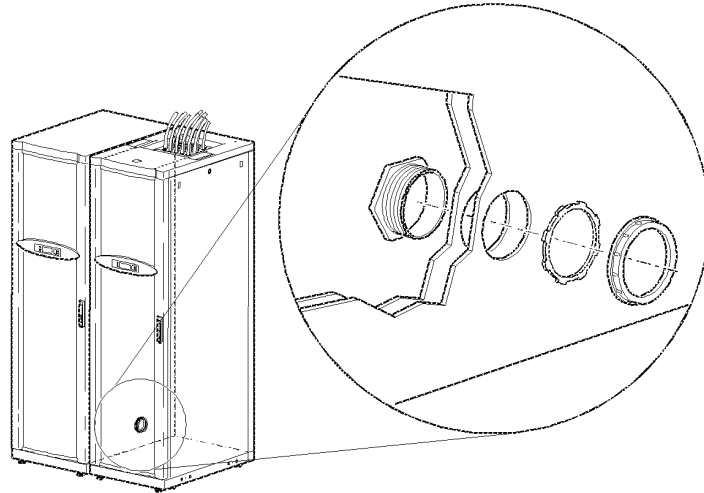


3. Install on the Symmetra 3-Phase UPS the side panel (with the pre-punched hole) that you removed from the PDU with System Bypass in Step 2.
4. Install, on the PDU with System Bypass, the solid side panel that you removed from the Symmetra 3-Phase UPS in Step 1.



Join the Symmetra 3-Phase UPS enclosure to the PDU with System Bypass enclosure

1. Move the Symmetra 3-Phase UPS into position next to the PDU with System Bypass, aligning the two openings in the lower part of the adjacent side panels.
2. Level both the PDU with System Bypass and the Symmetra 3-Phase UPS. For instructions, see “How to level an enclosure” on page 44.
3. Thread the chase nipple (p/n 820-0071), through the opening in the adjacent side panels of the PDU with System Bypass and the Symmetra 3-Phase UPS.



4. Tighten the lock-nut and the bushing on the chase nipple.

Connection to be performed by a licensed electrician only!



A licensed electrician must connect the PDU with System Bypass to the main utility power. Procedures requiring a licensed electrician include:

- connection of main utility conductors
- connection to the input circuit breaker of the PDU with System Bypass
- connection to a branch circuit



This PDU with System Bypass contains no parts that are serviceable by general users. Refer all servicing to APC Field Service Engineers.

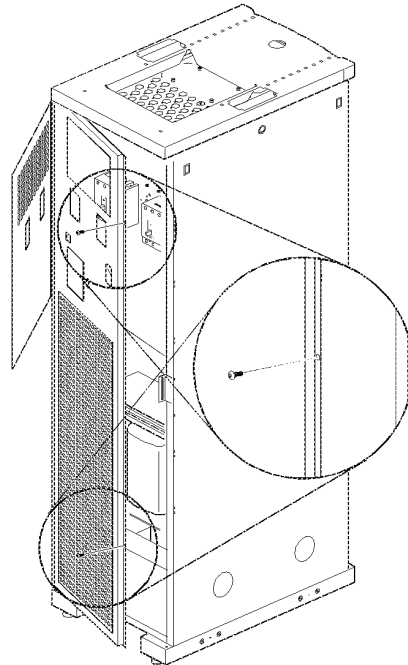
Connect main utility power



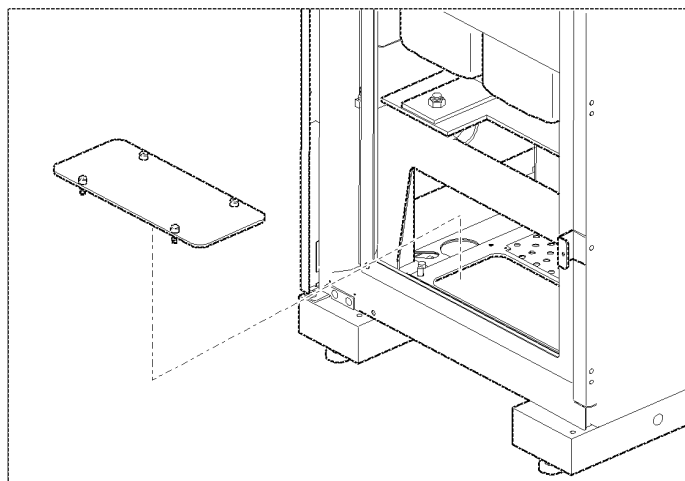
Ensure that utility power is OFF before beginning installation.

A licensed electrician must connect the main utility power:

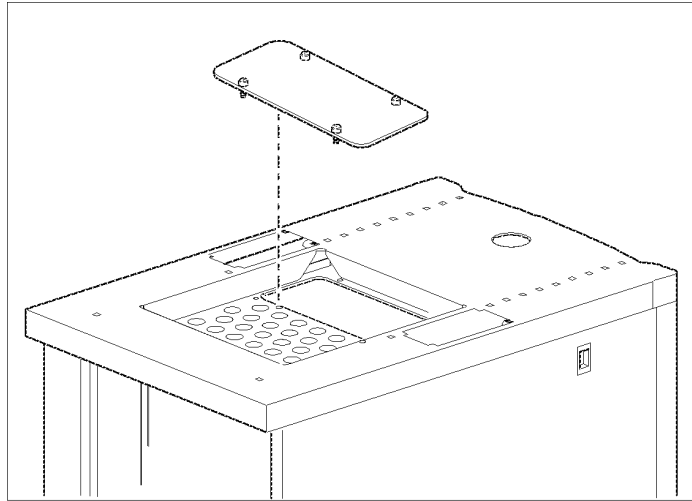
1. Run three-wires with an equipment ground wire and a GEC (grounding electrode conductor) from the main utility service of the building to the PDU with System Bypass.
2. Open the back doors of the PDU with System Bypass, using the provided key for the top, smaller door and loosen the two screws holding the larger hinge door in place.



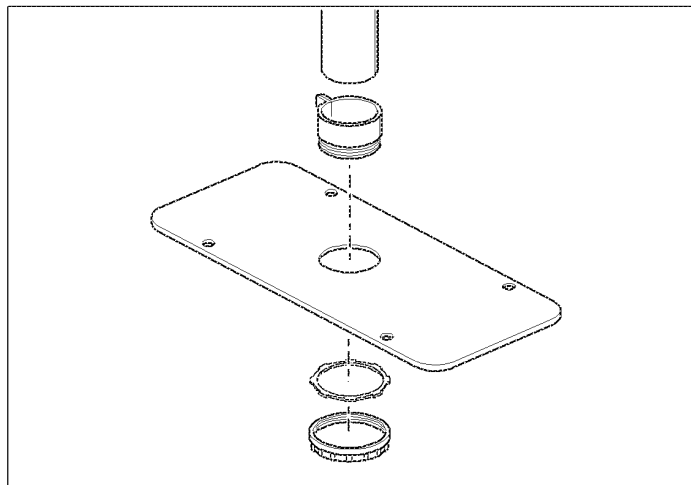
3. Remove the rectangular gland plate by loosening the captive screws, using a Phillips or standard screw driver:
 - a. in the bottom of the PDU with System Bypass for wiring under a raised floor.




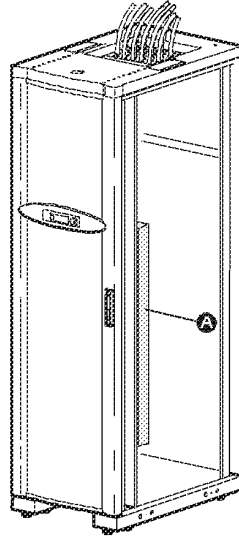
b. or in top of the PDU with System Bypass for overhead wiring.



4. Cut an appropriately-sized hole in the gland plate for the conduit.
5. Re-attach the gland plate.
6. Install a lock-nut and bushing to the conduit.
7. Thread the conduit through the hole.



8. Route the input conductors to the main input circuit breaker of the PDU with System Bypass, as follows:
 - a. For wiring under a raised floor, run the input conductors through the wireways  at the right or left side within the PDU with System Bypass to the main input circuit breaker of the PDU with System Bypass.



- b. For overhead wiring, run the cable directly to the main input circuit breaker of the PDU with System Bypass.

A licensed electrician must connect the input wiring to the PDU with System Bypass:

9. At the main input circuit breaker, connect the input wiring to the PDU with System Bypass circuit breaker terminals for phase L1, L2, and L3, according to the following color-coding:

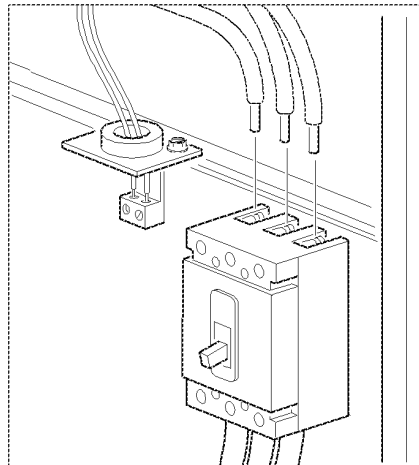
Input Voltage	L1	L2	L3
208 V	Black	Red	Blue
480 V	Brown	Orange	Yellow
600 V	Red	Black	Blue



Warning

Tighten the lugs on the circuit breaker terminals only to the torque specified on the circuit breaker's label.

10. Connect the equipment ground wire to the lug on the bracket next to the circuit breaker.
11. Connect the GEC to the second lug on the bracket next to the breaker and connect to building steel.



Symmetra 3-Phase UPS



Warning

Only qualified personnel trained by APC may connect the Symmetra 3-Phase UPS to the PDU with System Bypass.

Tools required

Tool Required	Supplied?
13 mm socket wrench	No
17 mm socket wrench	No
T-20 screwdriver	No
Standard screwdriver	No

Position, level, and attach the Symmetra 3-Phase UPS

Before connecting the Symmetra 3-Phase UPS, you should first position and level it and then join the Symmetra 3-Phase UPS to the PDU with System Bypass. See “Exchange side panels” on page 32, “How to level an enclosure” on page 44, and “Join the Symmetra 3-Phase UPS enclosure to the PDU with System Bypass enclosure” on page 33.

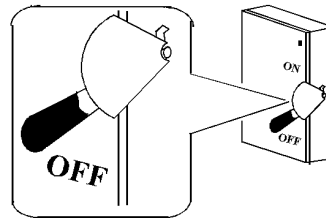
Ensure that all power is off



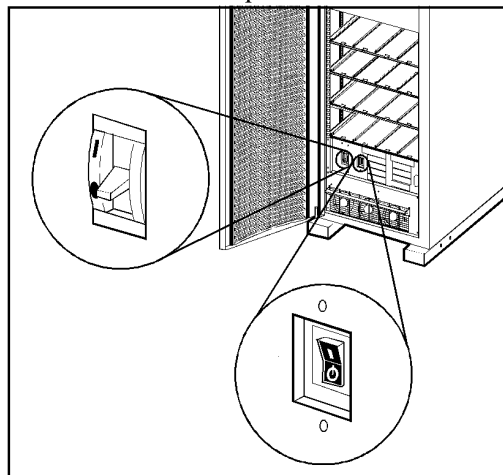
Electrical Hazard

Before electrical installation begins, ensure that power is off by following the procedure below:

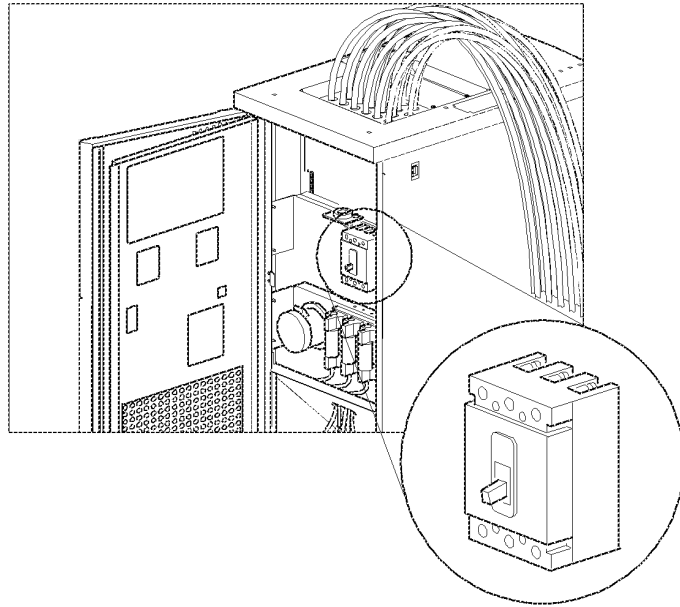
1. Set utility power to the OFF or Locked Out position.



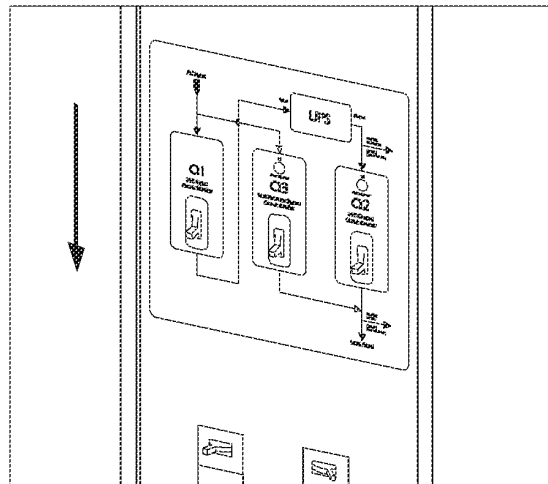
2. Open the DC breaker and set the System Enable switch on the Symmetra 3-Phase UPS to the Off position.



3. Open the Main input circuit breaker on the PDU with System Bypass.



4. Open the Q1, Q2, and Q3 breakers on the PDU with System Bypass.



Perform all power wiring before installing modules into the Symmetra 3-Phase UPS.

Note

Connect the PDU to the UPS



Warning

Only qualified personnel trained by APC may connect the Symmetra 3-Phase UPS to the PDU with System Bypass.

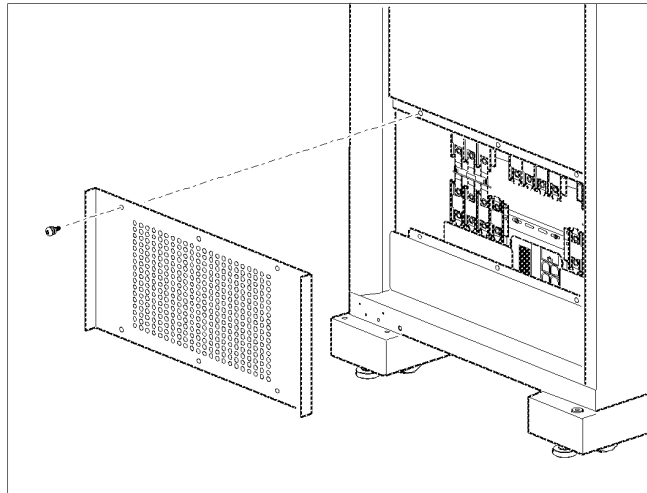
Attach power wiring to and from the Symmetra 3-Phase UPS. The power wires are coiled in the bottom of the PDU with System Bypass. Five input wires are at left and four output wires are at the right. Both sets are labeled with colors: black for L1, red for L2, blue for L3, white for neutral, and (input only) green for the equipment ground wire.



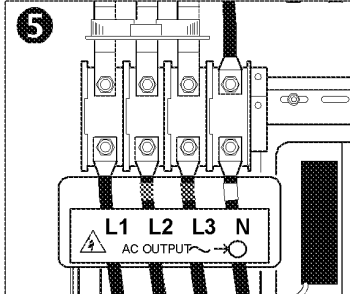
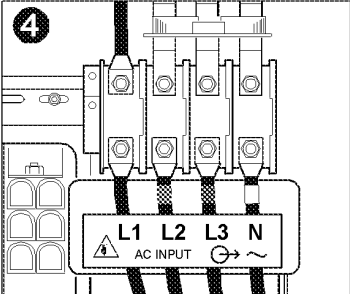
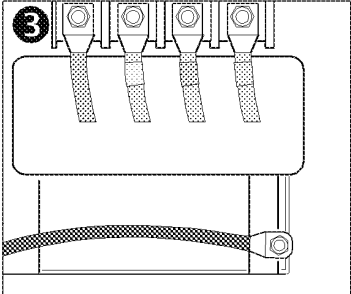
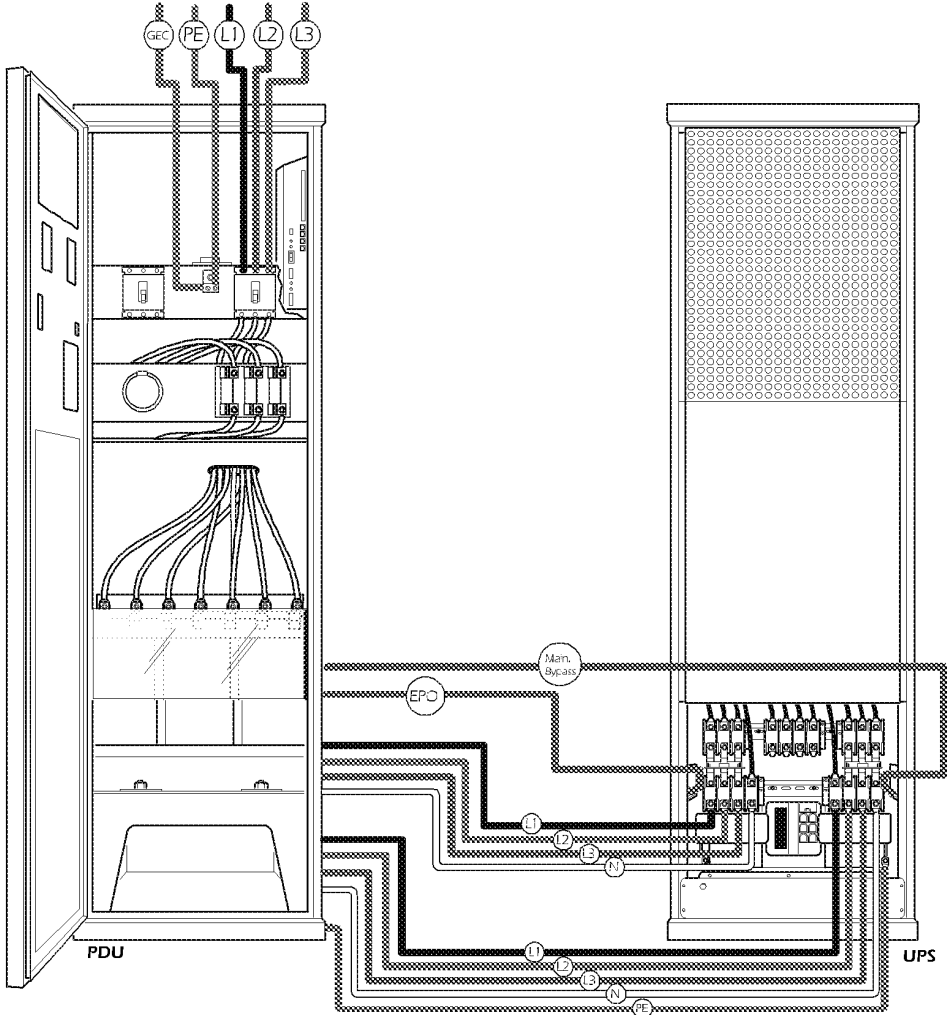
Note

Refer to the wiring diagram on page 41 as you follow this procedure:

1. Remove the back lower panel of the Symmetra 3-Phase UPS.

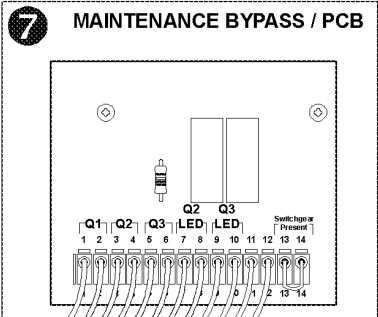
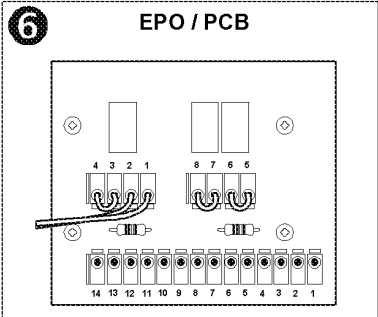


2. Use the opening in the side panels of the PDU with System Bypass and Symmetra 3-Phase UPS to run the wires between the units.
3. Attach the equipment ground wire from the PDU with System Bypass to the ground stud below the input terminal block at right on the Symmetra 3-Phase UPS (Ⓔ).
4. Attach the neutral wire and the input wires for the phases to the connectors with the corresponding colors and labels on the input terminal block at right on the Symmetra 3-Phase UPS (Ⓕ).
5. Attach the neutral wire and the output wires for the phases to the connectors with the corresponding colors and labels on the output terminal block at left on the Symmetra 3-Phase UPS (Ⓖ).
6. Connect EPO control wires from the PDU with System Bypass to the EPO board on the Symmetra 3-Phase UPS (Ⓖ).
7. Connect Maintenance Bypass control wires from PDU with System Bypass to the Maintenance Bypass interface board (Ⓙ) of the Symmetra 3-Phase UPS .



UPS Interface

UPS Interface



Emergency Power Off

Choose a connection method

Choose one of the following methods to connect a switch to the EPO interface:

- 24 VDC
- 24 VAC
- Contact closure

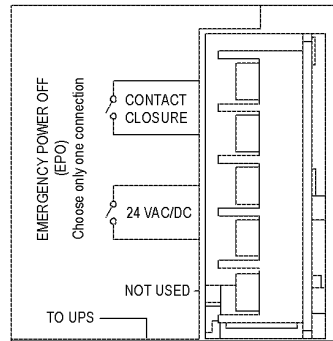


Note

Choose only one connection.

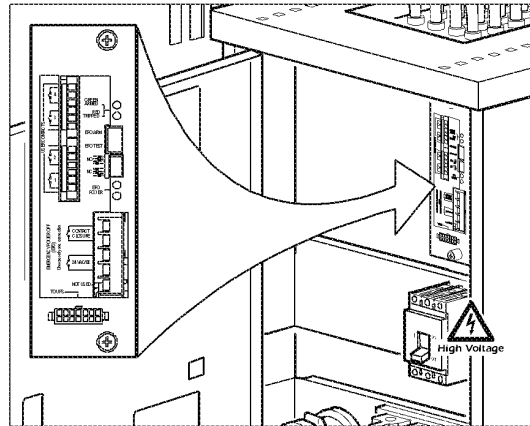
APC recommends contact closure.

The figure below is an illustration of the EPO interface on the PDU monitoring unit.



Connect a switch to the EPO interface

1. Access the monitoring unit through the back doors of the PDU with System Bypass.
2. Connect the switch to the EPO interface on the PDU with System Bypass monitoring unit.



Note

The default setting on the EPO interface is for a normally open switch.

3. If you are attaching a normally closed switch, flip the EPO DIP switch on the monitoring unit to change the default setting from a normally open to a normally closed setting.
4. Ensure that the TEST/ARM rocker switch is in the ARM position on the monitoring unit.

Safety warnings

Hazardous voltage from the branch circuit must be isolated from the 24 VAC, 24 VAC and contact closure. 24 VAC and 24 VDC are considered a Class 2 circuit as defined in Article 725 of the National Electrical Code (NFPA 70) and Section 16 of the Canadian Electrical Code (C22.1).

A class 2 circuit is a source having limited voltage and energy capacity as follows:

- a. If an Inherently Limited Power Source, voltage and energy are limited to < 30 VAC, < 60 VDC, 8 A.
- b. If Not Inherently Limited Power Source, voltage and energy are limited to < 30 VAC, < 60 VDC, 250 VA, and the current is limited to $1000/V_{max}$. The fuse is limited to 5 A if < 20 VAC or 20 VDC, or $100/V_{max}$ if < 30 VAC or 60 VDC.

If choosing to use 24 VAC, 24 VDC or contact closure to perform the EPO function, the wires should be UL Listed, type:

- CL2 Class 2 cable for general purpose use; or
- CL2P Plenum cable for use in ducts, plenums and other space used for environmental air; or
- CL2R Riser cable for use in a vertical run shaft from floor to floor; or
- CL2X Limited Use cable for use in dwellings and for use in raceway.
- For installation in Canada, the cable should be CSA Certified, type ELC (extra-low-voltage control cable).

If CL2 cable is not used, the EPO wiring is to be routed in conduit. The conduit should not contain any hazardous branch circuit wiring.

NetShelter VX Enclosure

Tools required

Tools Required	Supplied
Standard screwdriver	No
Phillips screwdriver	No
Metric socket wrench or adjustable open-ended wrench	No
Metric hex drives	No
5mm allen wrench	Yes
Level	No
Open-ended wrench (13 mm/14 mm, for adjusting the leveling feet of the enclosure)	Yes
6 ft step ladder	No



Do not discard the open-ended wrench with the packaging of the enclosure!

Note

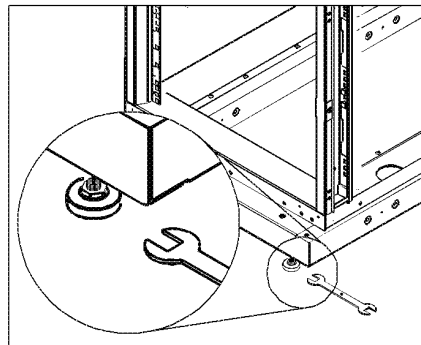
Position the enclosures

Position the first enclosure to the right or left of the PDU with System Bypass, depending on the location of the Symmetra 3-Phase UPS, and place each additional enclosure after the first to form a row. After placing the enclosures in the desired position, level, stabilize (if necessary), and join enclosures before installing any equipment.

How to level the enclosure

Leveling feet are attached under the enclosure at each corner. The leveling feet can help provide a stable base if the selected floor space is uneven, but they are not intended to compensate for a badly sloped surface. You can remove the casters and leveling feet to allow the base of the enclosure to rest directly on the floor.

1. Fit the 14-millimeter end of the open-ended wrench (included) to the hex head just above the round pad on the bottom of the leveling foot. Turn the wrench clockwise to extend the leveling foot until it makes firm contact with the floor.



2. Repeat step 2 for each of the remaining leveling feet.

3. Use a level to determine which feet need further adjustment to level the enclosure. Adjust as necessary.



Do not move the enclosure after the leveling feet are lowered—the leveling feet may bend.

How to stabilize the enclosure

American Power Conversion offers two additional products for stabilizing enclosures:

- Stabilizer Plate Kit (AR8115ABLK)—one plate and mounting hardware for attaching to the enclosure frame. One plate can be installed in front and two plates can be used on each side. Stabilizer plates may also be bolted to the floor to add stability.
- Bolt Down Bracket Kit (AR8112BLK)—four brackets and mounting hardware for attaching to the enclosure frame on the sides (exterior or interior). These brackets must be anchored to the floor to provide stabilization.

How to join enclosures together

You can expand your installation by joining an expansion enclosure to a base enclosure or two expansion enclosures together. The procedure involves removing one side panel of the base enclosure and attaching it to the open side of the expansion enclosure. The expansion enclosure consists of expansion hardware and vertical baying trim that covers the gap between the joined enclosures for a finished appearance.

Before joining enclosures. Sometimes you must change enclosure configurations before joining enclosures together. Often this means reversing the front door on one of the enclosures or moving the trim from one side of an enclosure to the other.

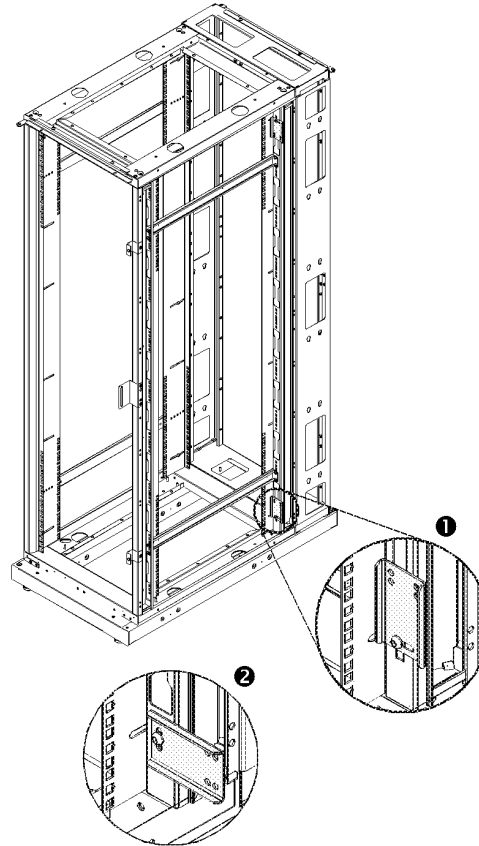
Preliminary steps for joining enclosures.

1. Reverse the door, if necessary. (See “How to reverse the door” on page 135.)
2. Remove the side panel from the existing enclosure or bay if necessary. (See “How to remove and install the side panels” on page 131.)
3. If necessary, move the vertical baying trim from one side of the expansion enclosure to the other side. (See “How to move the vertical baying trim” on page 141.)

How to join enclosures.

1. Connect the four baying brackets pre-installed on the expansion enclosure to the base enclosure:
 - a. Using the 5 mm Allen wrench (included), loosen the socket-head screw that is holding the baying bracket to the expansion enclosure.

- b. Rotate the bracket from its original position ❶ to its new position ❷.



- c. Push the two enclosures together until the holes in the free end of the baying bracket are aligned with holes in the frame post of the base enclosure. The outer holes on the baying brackets are used when installing on 24-inch raised-floor tiles, and the inner holes on the baying brackets are used when installing on 600-millimeter raised-floor tile.
- d. On the base enclosure, insert a caged nut into the holes that align with the holes in the expansion bracket.
- e. Repeat steps a–d for each expansion bracket.
- f. On the base enclosure, insert a socket-head screw through the holes in the bracket, the frame post, and caged nut. Hand-tighten the screw.



Note

Do not fully tighten the screws at this time. They will be secured after all four mounting brackets have been installed.

- g. Repeat for the three remaining baying brackets.
2. Align the two enclosures as closely together as possible and then tighten all socket-head screws on each of the four baying brackets.
 3. Reinstall any side panels, as required. Side panels removed from base enclosure can be used on the expansion enclosure.

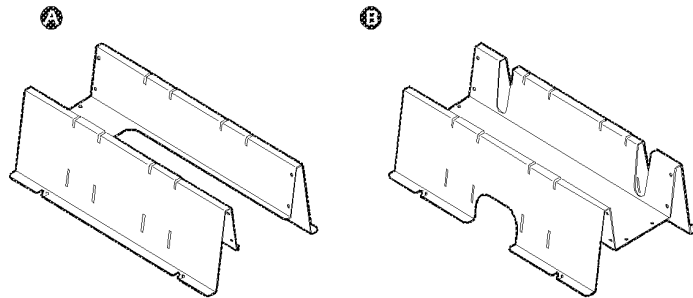
Cable Troughs, Partitions, and Ladders

Troughs and partitions for overhead wiring along rows

If you ordered APC cable troughs, partitions, and ladders to route overhead wiring for your PowerStruXure system, you must assemble the power cable troughs and the data cable partitions along the rows of enclosures and assemble the ladders between rows.

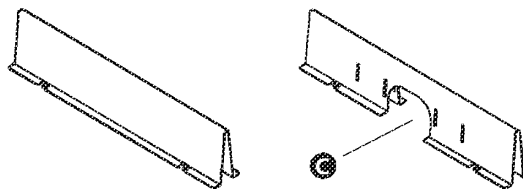
Power cable troughs. Each power cable trough is two feet in length and is not adjustable. There are two types of power cable troughs:

- Ⓐ The PDU power cable trough sits atop the PDU with System Bypass and has an opening in one end to fit around the power cables where they exit the PDU with System Bypass.
- Ⓑ The NetShelter VX power cable troughs have an opening in each side through which you can route data cables to the data cable partitions.



Data cable partitions. There are two types of data cable partitions, each of which forms a side wall of a trough for data cables. You can customize the width of the trough for each row of your system—wider for rows carrying many data cables, narrower for rows carrying fewer.

A data cable trough for each row must use, as its back wall, a partition that contains an opening (Ⓒ) for routing data cables.



How to install power cable troughs

Use the procedure in this section for both the PDU and NetShelter VX power cable troughs. Make sure you install the PDU power cable trough on the PDU with System Bypass.

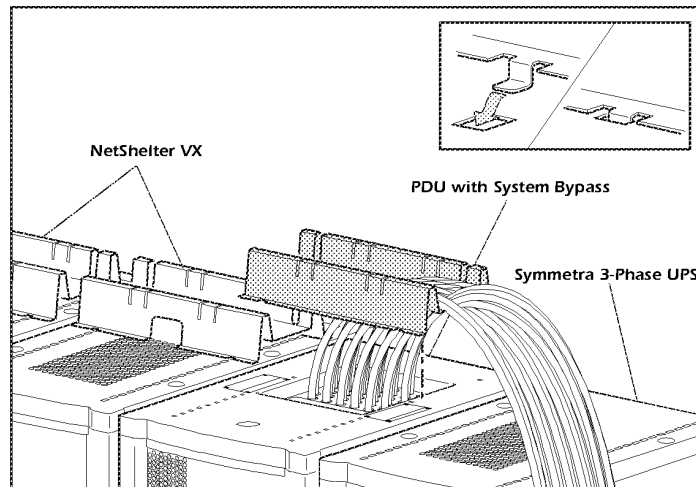


Note

When installing NetShelter VX power cable troughs, be sure that the opening for routing data cables is facing the **front** of the enclosure.

Install power cable troughs along the back edge on the roof of each row of enclosures. To install:

1. Insert the rear set of fastening tabs into the square holes along the top back of the unit.
2. Squeeze the sides of the section towards each other at the bottom to insert the front fastening tabs.



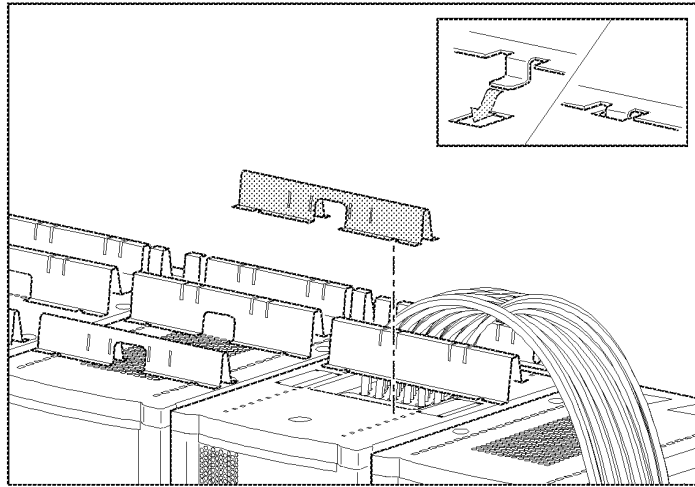
Note

When installing the PDU power cable troughs, drape the power cables (whips) over the UPS as shown. After you have finished installing the troughs in the row, route the power cables using the troughs.

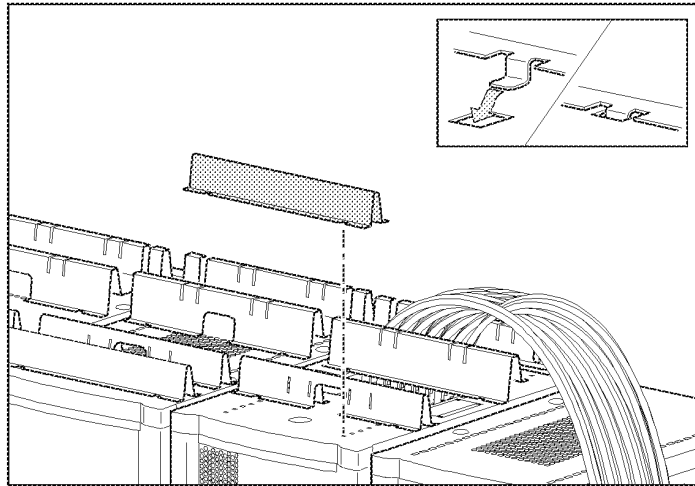
How to install data cable partitions

Use the procedure in this section to install all data cable partitions. You can install data cable partitions on any enclosure.

1. Squeeze the two sides of a partition to insert the fastening tabs into the set of square holes toward the back of the roof of the enclosure, next to the power cable trough sections already installed.



2. At the width you need for the data cable trough, install the other partition in the same manner at the front of the roof of the enclosure.



Ladders for overhead wiring across rows

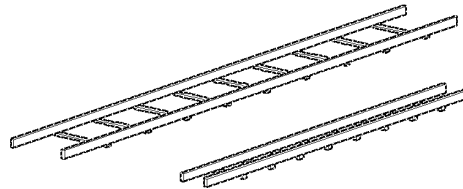
After installing the power cable troughs and data cable partitions, install the ladders between rows of enclosures.



Note

If you are installing more than one row of enclosures within the PowerStruXure system, you must install an overhead ladder.

Use wide (12-inch) ladders where many power cables or data cables will run between rows; use narrow (6-inch) ladders where few power cables or data cables will run between rows (e.g., to rows farthest from the PDU with System Bypass.)



You can adjust the length of the ladders in the following ways:

- You can cut back the ends to shorten them by using a hacksaw
- You can extend their length several inches by inserting the connectors only partially into the side rails.



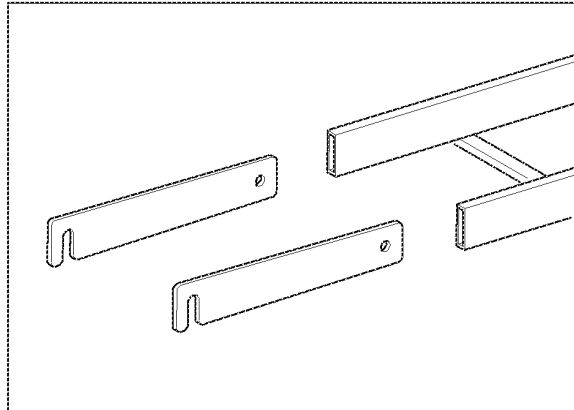
Note

Do not change the spacing between rows and the length and physical positioning of the ladders from the basic layout you planned with your APC representative when you placed your order. For overhead wiring, each whip is provided at a pre-determined length to reach the enclosure whose devices it will support. Changes to the physical configuration of your PowerStruXure system could cause some power cables (whips) to be too short or too long.

**How to install ladders
across rows**

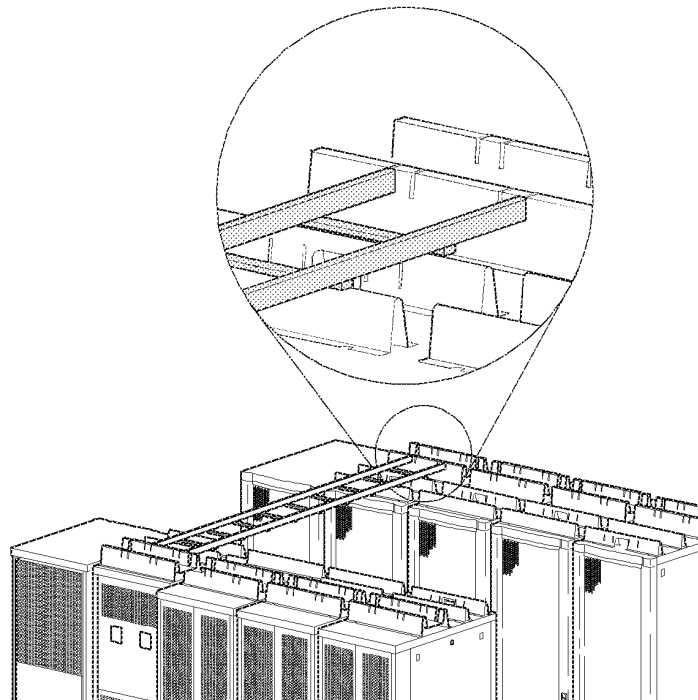
To install the ladders for typical configurations:

1. On each side rail of the ladders, insert the ladder brackets.

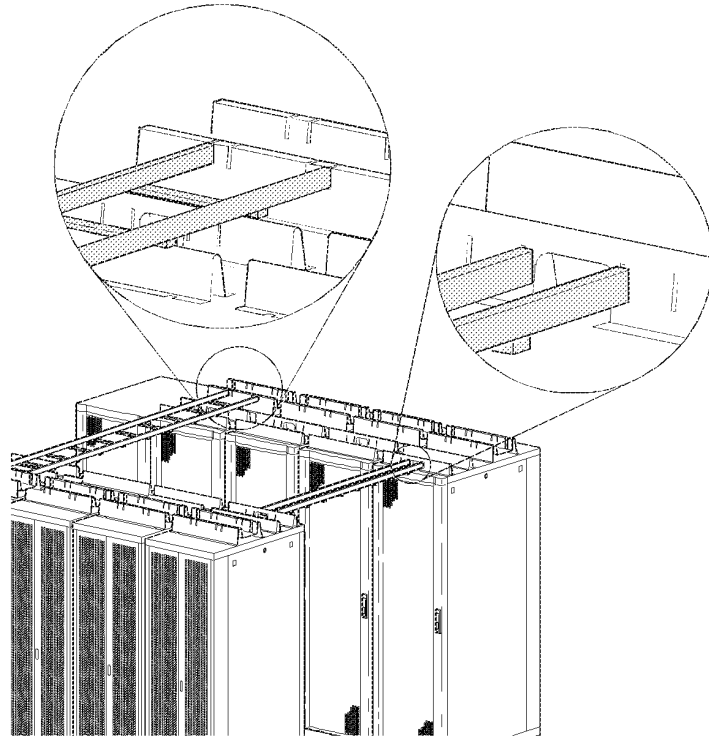


2. Attach the ladders to the troughs in one of the three (a–c) following ways:

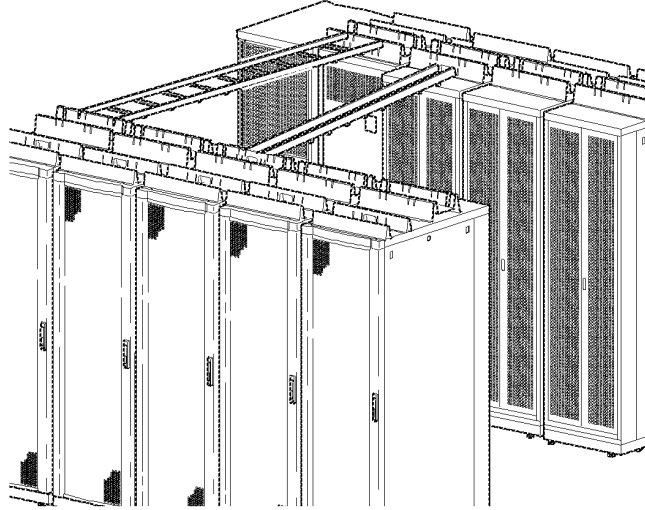
- Ⓐ For two rows of enclosures that face front to front, do one of the following:
 - Use the ladder brackets to attach the 12-inch ladder to the slotted top of the power cable troughs of adjacent rows. The ladder runs above the data cable partition to span the rows and to carry power cables and data cables.



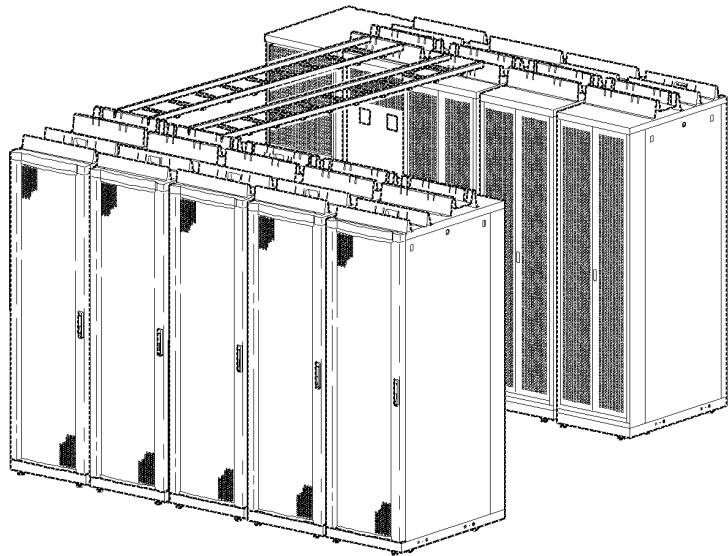
- Use two ladders, one attached between power cable troughs to carry power cables, and the other between data cable partitions to carry data cables.



- Ⓔ For two rows of enclosures that face back to back attach the ladders as follows:
- Attach one ladder to the slotted top of the power cable trough to carry power cables across rows.
 - Attach another ladder to the slots low on the side of the power cable trough at an opening for the data cables. This ladder will carry data cables after they are routed through the opening under the power cable trough.



- Ⓕ Alternatively, you can mount the two ladders side by side, using the slots in the top edge of the power cable trough.



Power Cables (Whips)

Route and attach overhead wiring

If you ordered overhead wiring, connect the prewired power cables of the PDU with System Bypass as follows:

1. Install the troughs, partitions, and ladders as described in “Cable Troughs, Partitions, and Ladders” starting on page 47 so that you can route power cables from the PDU with System Bypass to the NetShelter VX enclosures.
2. Find the numbers that indicate the enclosure to which each power cable will supply power. These numbers appear on the roof of the PDU with System Bypass where the power cables exit, and they also appear on the ends of each power cable.



Note

The enclosures are not numbered. Consult your APC PowerStruXure Configuration Buildout Tool to determine the enclosure associated with each power cable.

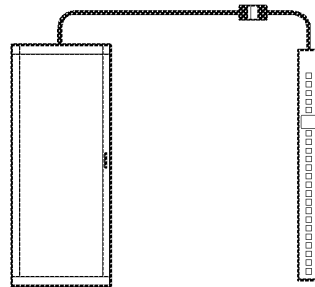
3. Beginning with the power cables for the enclosures farthest from the PDU with System Bypass, run each power cable within the power cable trough along the row and, if necessary, across one or more ladders to the enclosure to which it will provide power.



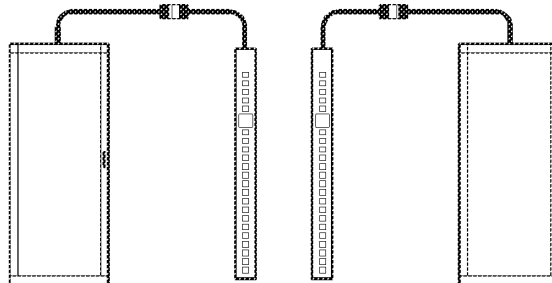
Note

Ensure that the L21-20 twist-lock connector at the end of each power cable always lies on top of any longer power cables in the trough.

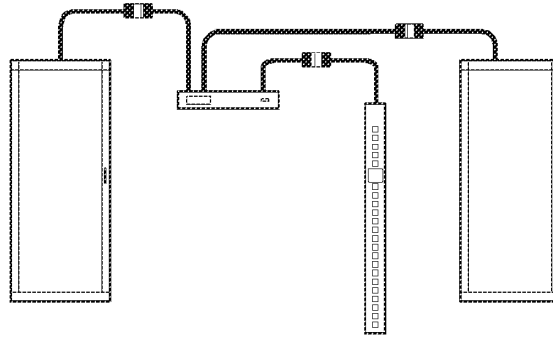
4. Connect the appropriate power cable to APC power management equipment in the enclosure in one of the four following ways:
 - For single-feed devices without redundancy, attach a power cable directly to a Metered Rack-Mount PDU installed in a NetShelter VX enclosure.



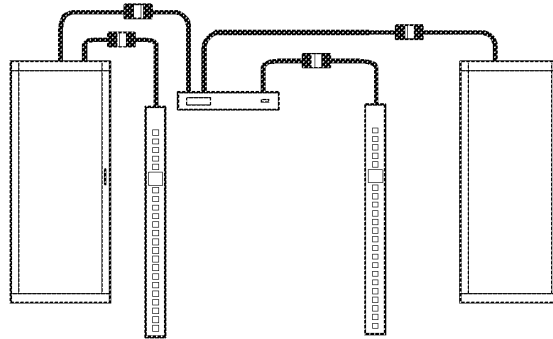
- For dual-feed devices within a redundant system, attach a power cable from each PDU with System Bypass into two different Metered Rack-Mount PDUs in the NetShelter VX enclosure.



- For single-feed devices within a redundant system with an Automatic Transfer Switch, connect a power cable to the Automatic Transfer Switch (A and B feeds) and connect the Automatic Transfer Switch power cord to a Metered Rack-Mount PDU in the NetShelter VX enclosure.



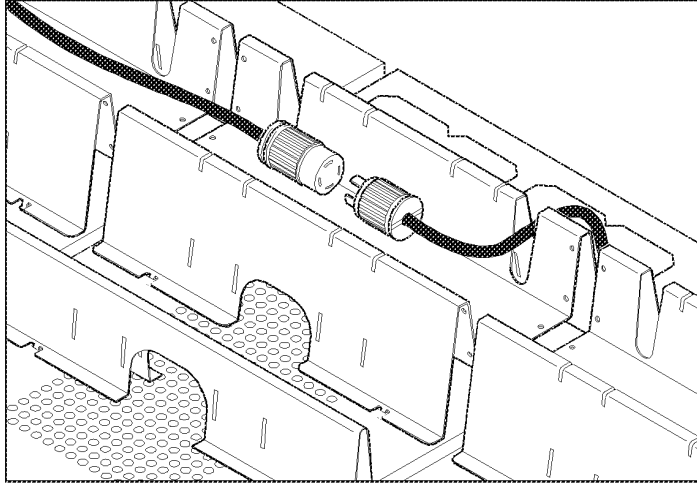
- For dual-feed devices in a redundant system with an Automatic Transfer Switch, connect a power cable from each PDU with System Bypass to the Automatic Transfer Switch's A and B feeds, and another power cable from one PDU with System Bypass to a Metered Rack-Mount PDU, and the Automatic Transfer Switch's power cord to a second Metered Rack-Mount PDU in the NetShelter VX enclosure.



Lay the cables neatly in the trough to minimize cable build up. If they are not laid neatly, all the cables will not fit.

Note

5. From each NetShelter VX enclosure, run the power cable of the appropriate APC power management device out the roof of the enclosure, through the notch in the rear side of the power cable trough, to the connector of the appropriate power cable from the PDU with System Bypass. Plug the two twist-lock connectors together, and twist them clockwise to lock.



Wiring under the floor



A licensed electrician must route and connect the power cables for under-floor wiring.

If you plan to route the power cables (whips) to the enclosures under a raised floor, you must provide the appropriate power cables and equipment for installation, and a licensed electrician must route and connect the power cables to the circuit breakers of the PDU with System Bypass. To wire each cable to an enclosure:

1. Push out a knock-out filler in the floor of the PDU with System Bypass to create an opening for the cable.
2. Install Liquidtite™ waterproof conduit under the floor from the enclosure to the PDU with System Bypass.
3. From the Metered Rack-Mount PDU or Automatic Transfer Switch in the enclosure, thread a four-wire cable with ground from the enclosure through the Liquidtite conduit to the PDU with System Bypass.
4. At the PDU with System Bypass, route the four-wire cable with ground through the opening you created in step 1 and then up through the wireways at the left or right side within the PDU with System Bypass. This will allow you to connect the four-wire cable to the breaker panel.
5. At the breaker panel, cut the wires to the proper length, connecting the three “hot” wires to a properly sized three-phase circuit breaker on the PDU with System Bypass.
6. Connect the neutral wire to the neutral bar and the ground wire to the ground bar.



Make sure all wire connections and circuit breaker connections are properly torqued.

3-Phase Automatic Transfer Switch

Placement

Reserve the top 1U space (for overhead wiring) or bottom 1U space (for under-floor wiring) in the NetShelter VX enclosures for the Automatic Transfer Switch.

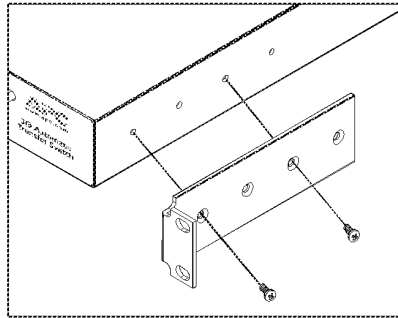
Attach mounting brackets

1. Attach the left and right mounting brackets to the unit, using two flat-head, Phillips screws (provided) for each bracket.



Note

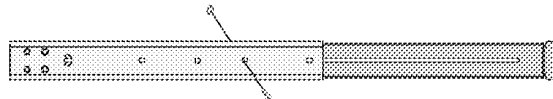
Place the brackets flush with the front of the rack to leave room for routing cables.



Disassemble segments of the adjustable bracket

The adjustable brackets are necessary only if you are using a four-post enclosure or rack. If you are using a two-post rack, the Automatic Transfer Switch is supported by the mounting brackets alone.

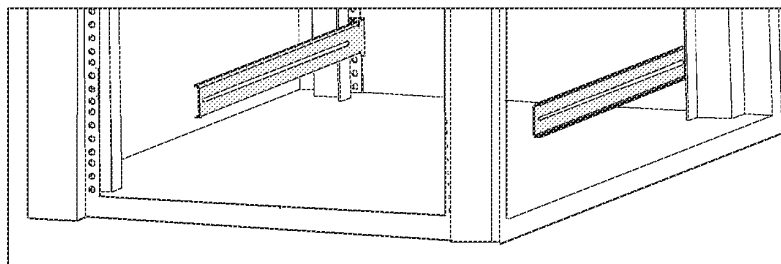
1. Disassemble each adjustable bracket by removing the slide screw and nut.



2. Set the screws, nuts, and the adjustable bracket segments aside.

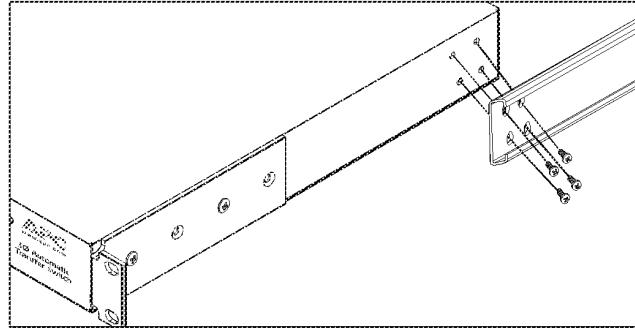
Attach rear segments to the rack

1. Insert caged nuts (included) on the enclosure's rear vertical mounting rails at your chosen location.
2. Align the rear segments of the adjustable bracket with the caged nuts you inserted in Step 1.
3. Insert mounting screws (included) and tighten.



Attach front segments to the switch

1. Align the front segments of the adjustable bracket with the four holes on the sides of the switch.
2. Attach both front segments to the switch using four Phillips pan-head screws and washers (provided) for each bracket segment.



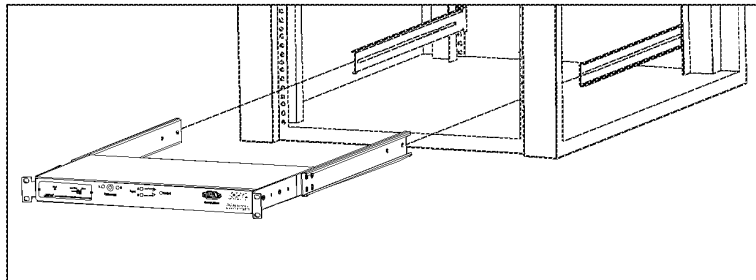
Mount the Automatic Transfer Switch in the enclosure



Two people should perform this step.

Warning

1. Position the Automatic Transfer Switch in front of the mounted rear adjustable bracket segments.
2. Align the front and rear adjustable bracket segments and slide the front segments onto the rear segments.
3. Align the mounting brackets of the Automatic Transfer Switch with the front vertical mounting rails and insert caged nuts (included) in the appropriate holes on the front vertical mounting rails.
4. Insert mounting screws (included) and tighten.
5. Insert slide screws and nuts into each adjustable bracket and tighten to secure the positions of the adjustable brackets.



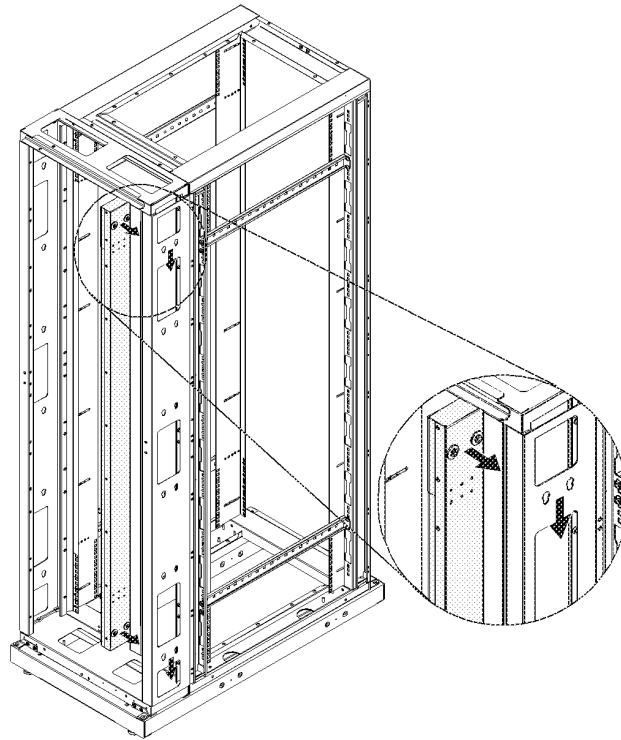
Metered Rack-Mount PDU

Mounting options

You can install Metered Rack-Mount PDUs in one of two ways: using toolless mounting pegs or the mounting brackets. The Metered Rack-Mount PDUs are mounted in the rear of the enclosure, in the channel directly behind the rear vertical mounting rails. Before you begin to install the Metered Rack-Mount PDUs, choose a location for them in the enclosure and decide on the mounting method.

Toolless mounting

1. Slide the mounting pegs into the holes provided in the channel in the rear panel of the enclosure. Make sure the bottom pegs slide into the bottom holes in the enclosure.
2. Snap the Metered Rack-Mount PDU into place by pushing it downward until it locks into position.

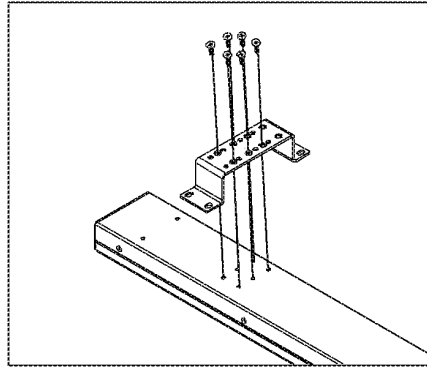


Bracket-mounting

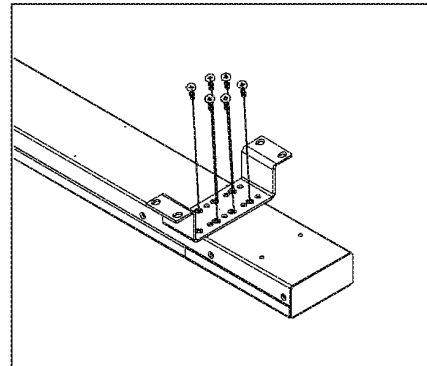
You can attach a pair of brackets to the Metered Rack-Mount PDU in two different directions, shown in the figures in step 1. Consider the orientation of the Metered Rack-Mount PDU in the enclosure before attaching the brackets. A recessed orientation allows the Metered Rack-Mount PDU to be mounted flush with the enclosure; a raised orientation allows you to route cables through the channel (see the figures in step 2).

1. Attach two brackets to the rear of the Metered Rack-Mount PDU, using six pan-head screws (provided in the bracket kit) for each bracket.

– Recessed Orientation

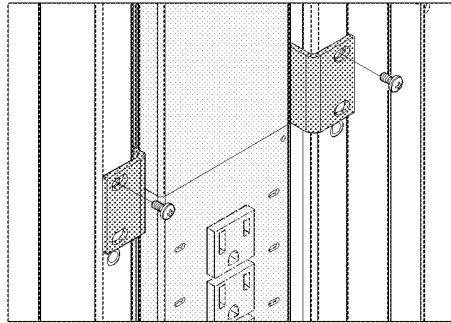


– Raised Orientation

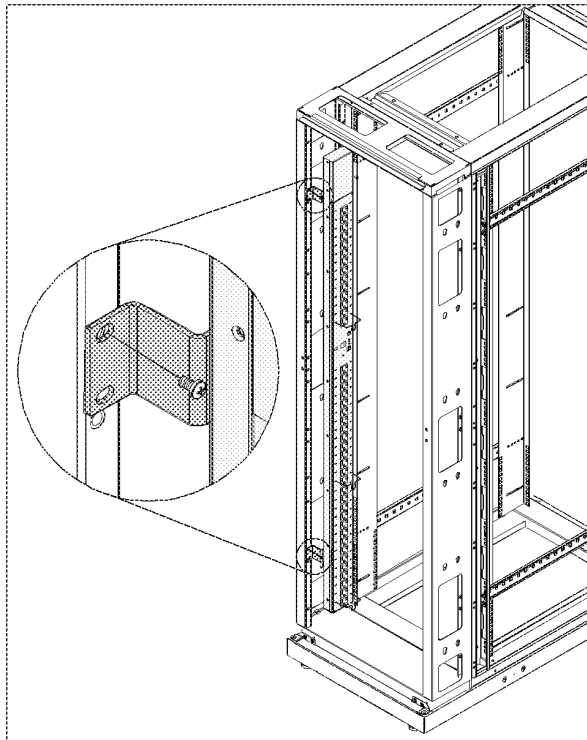


2. Insert one mounting screw (provided with the bracket kit) in the top and bottom positions in the channel where the brackets align with the holes. Tighten to secure the Metered Rack-Mount PDU to the enclosure.

– Recessed Orientation



– Raised Orientation

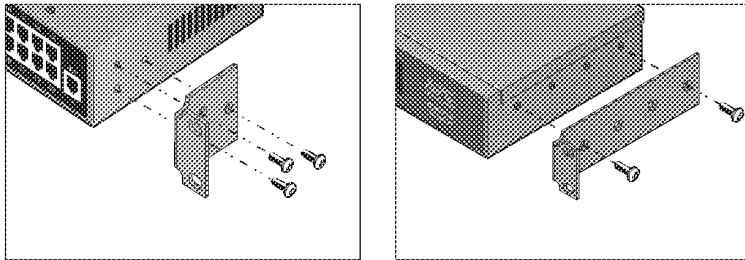


Information Controller and Hub

The Information Controller and Hub will come pre-installed in the PDU with System Bypass. However, if at any time you need to install either or both of the units into a rack or PDU, follow the procedure in this section.

Attach mounting brackets to the Controller and Hub

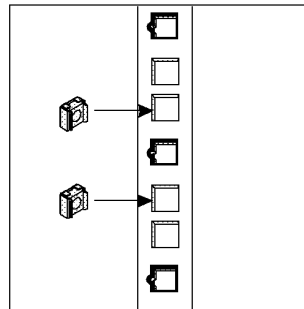
1. Attach the left and right mounting brackets to the controller, using two flat-head, #2 Phillips screws (provided) for each bracket.
2. Attach the left and right mounting brackets to the hub, using three flat-head, #1 Phillips screws (provided) for each bracket.



Mount the Controller and Hub in the PDU with System Bypass

The top 1U space in the PDU with System Bypass enclosure is reserved for the Information Controller Hub, and the second 1U space is reserved for the Information Controller. In the NetShelte VX, use the top two U spaces for the Information Controller and the Information Controller Hub. Use the following procedure for installing both components:

1. Insert caged nuts (provided with the enclosure) above and below the notched holes on the vertical mounting rails, occupying the reserved 1U space for the component you are installing in the enclosure.



2. Plug the component into one of the provided power cords pre-installed in the PDU with System Bypass and slide it into place. If you are installing the component into a NetShelter VX or a rack, use the provided power cords.
3. Align the mounting holes on the brackets with the caged nuts you installed in Step 1, and insert two mounting screws (provided with the enclosure) to secure the brackets to the enclosure.

System Start-Up

Start-Up Procedure	67
Important safety information	67
Ensure that power is off	67
Apply power to the system	68
Start the UPS using the display interface	71
Verify proper phasing	73
Power the PDU distribution breakers	74

Start-Up Procedure

Important safety information



Only qualified APC trained personnel may perform a system start-up.



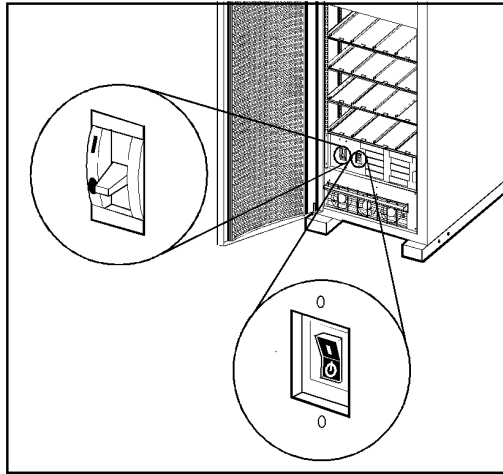
Only those trained in the construction and operation of the equipment and the electrical and mechanical hazards involved may install and remove system components.

Ensure that power is off

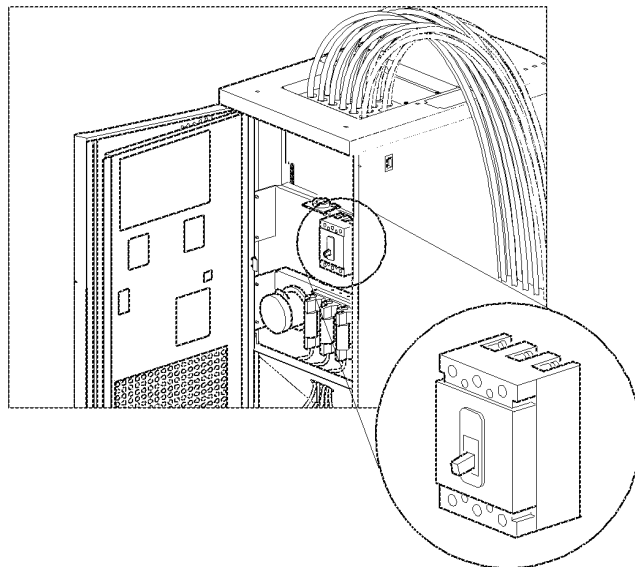


Before beginning the start-up procedure, ensure that power is off by following the procedure below:

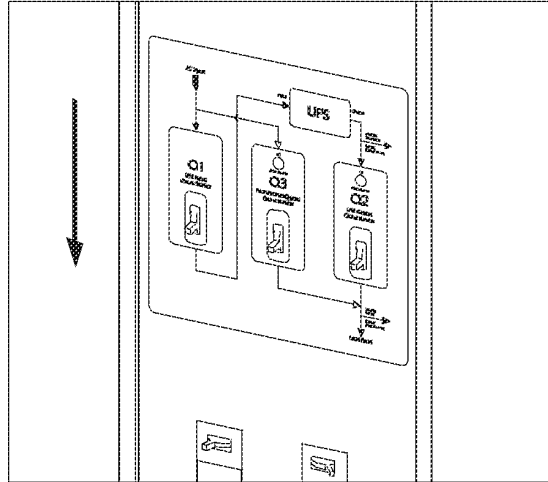
1. Open the DC breaker and turn off the System Enable switch on the Symmetra 3-Phase UPS.



2. Open the Main input circuit breaker on the PDU with System Bypass.

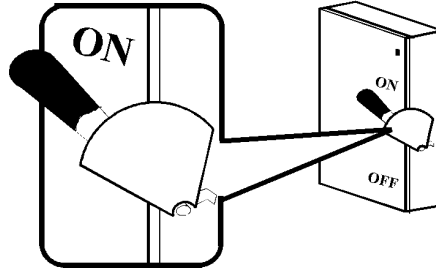


3. Open the Q1, Q2, and Q3 breakers on the PDU with System Bypass.

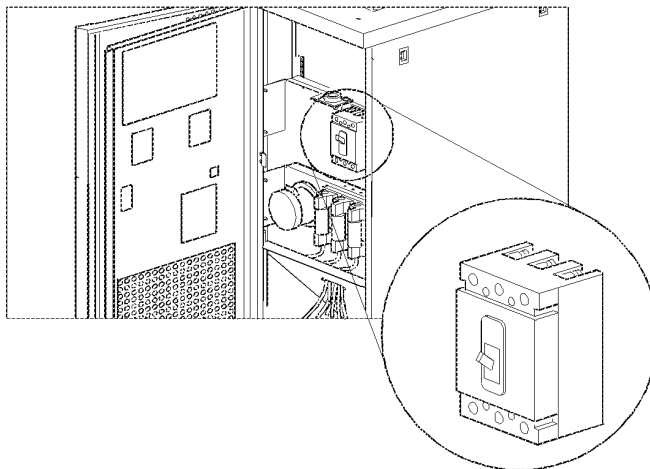


Apply power to the system

1. Apply utility power to the PDU with System Bypass.



2. Check the phase rotation at the top of input breaker on the PDU with System Bypass to ensure that it is A-B-C clockwise rotation, using a phase rotation meter.
3. Close the main input circuit breaker on the PDU with System Bypass.

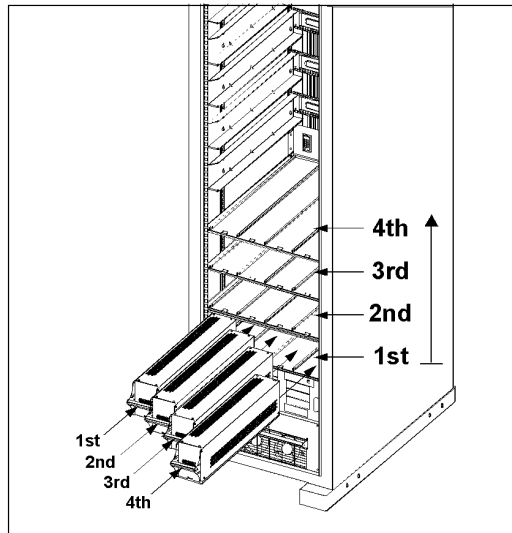


4. Verify that the proper voltage is present at the transformer (208 V, metered phase-to-phase), using a True RMS voltmeter. Verify the correct phase rotation at the top of the transformer, to ensure that it is an A-B-C clockwise rotation, using a phase rotation meter.



The DC bus in the Symmetra 3-Phase UPS is energized when battery modules are installed, even when the DC Disconnect breaker is open.

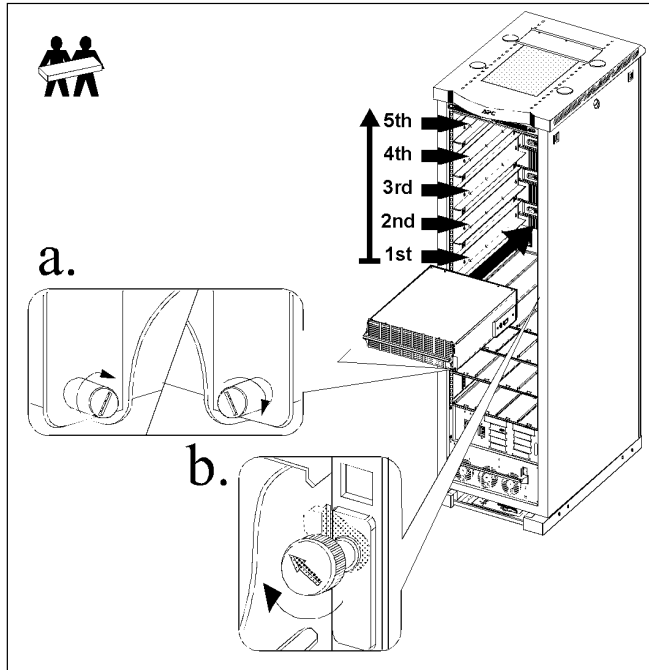
5. Install at least one battery module (4 battery units) in the Symmetra 3-Phase UPS. Install battery units four across, starting in the lowest available shelf. Position the battery unit to slide in, between the grooves, and push completely into the enclosure to ensure connection.



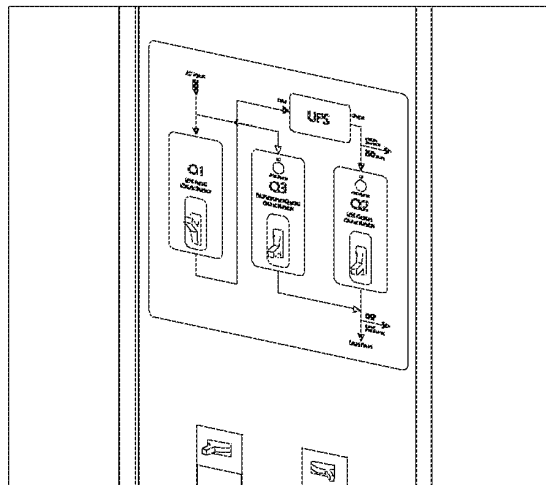
6. Install atleast one power module in the Symmetra 3-Phase UPS.
Install power modules in the top 5 shelves, starting from the lowest available shelf. Push the module completely into the enclosure and secure:
 - a. Tighten the screws on each side of the power module.
 - b. Turn the locking latch on the right hand side of the enclosure clockwise until the arrow faces the power module.



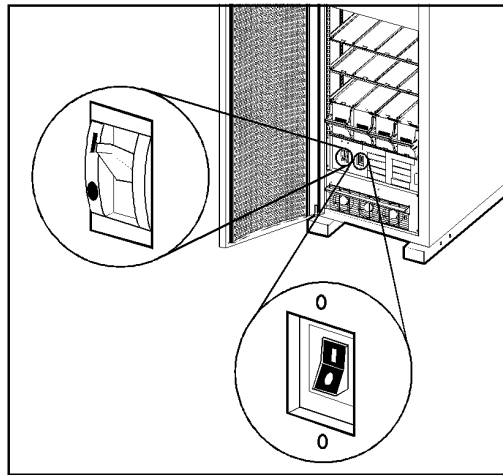
The power module will not start unless the locking latch is engaged.



7. Apply AC power to the Symmetra 3-Phase UPS input by closing the Q1 breaker on the PDU with System Bypass.

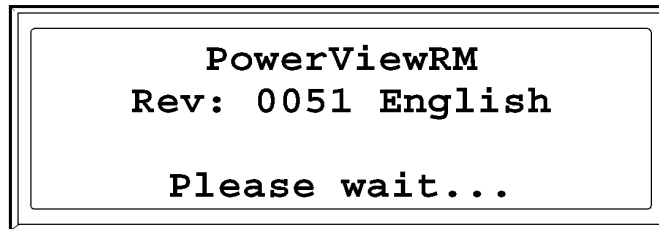


8. Check phase rotation at the Symmetra 3-Phase UPS input terminal block, ensuring that it is A-B-C clockwise rotation, using a phase rotation meter.
9. Close the DC breaker and turn on the System Enable switch on the Symmetra 3-Phase UPS.

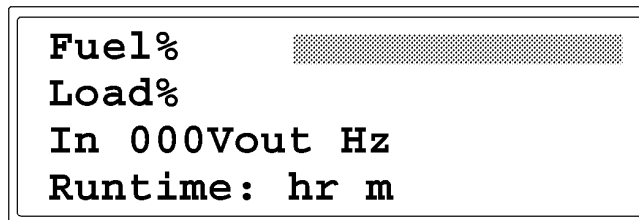


Start the UPS using the display interface

When the System Enable switch is placed in the ON position, the Startup screen appears on the display interface of the Symmetra 3-Phase UPS.



1. Note any alarms listed on the display interface of the UPS and verify that they are appropriate for start-up conditions. See "Basic troubleshooting" on page 118 for more information.
2. Referring again to the display interface, verify that the Symmetra 3-Phase UPS accepts the AC Mains input. After the display interface has established communication with the Symmetra 3-Phase UPS, the Monitoring screen appears.

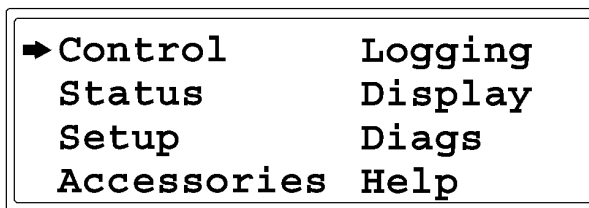


Default Monitoring Information

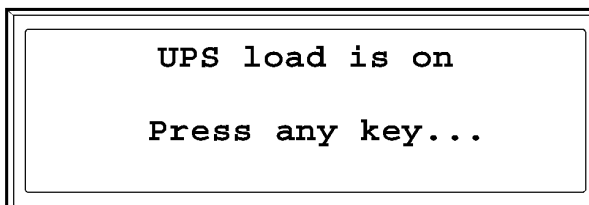
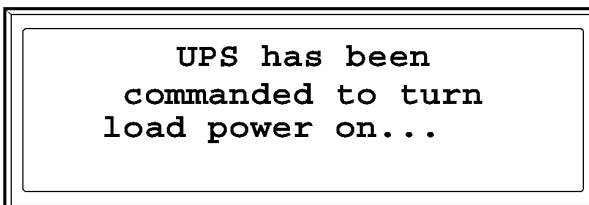
The factory default Monitoring screen displays the following status information.

Fuel Percentage	The percentage of battery capacity (fuel) that is available.
Load Percentage	The percentage of system capacity that is being used to supply conditioned power to the load equipment.
Voltage and Input Frequency	The input voltage from mains power, the output voltage supplied to the load equipment, and the frequency of the input (mains) power.
Run Time	The run-time that can be expected of the batteries. The intelligence module calculates the run-time based on both the amount of power required by the load equipment and the capacity of the battery modules in the enclosure.

3. Command the UPS to apply power to the load:
 - a. Press the ESC key at the Monitoring screen to open the Main menu. This menu allows access to eight submenus:

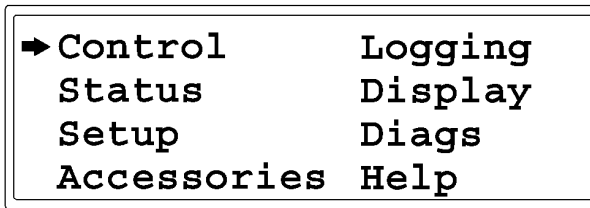


- b. Move the selection arrow to the **Control** item and press the ENTER key.
 - c. Move the selection arrow on the Control menu to the **Turn UPS On** item and press the ENTER key.
 - d. Confirm the selection on the next screen: move the selection arrow to the **Yes, UPS Load ON** item and press the ENTER key. The LOAD ON LED will illuminate and the display will show the following two screens:

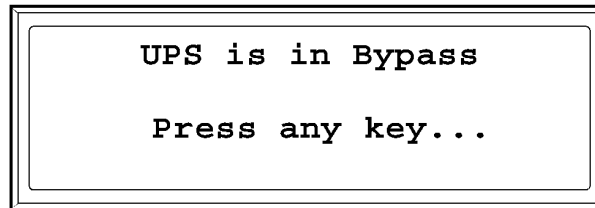
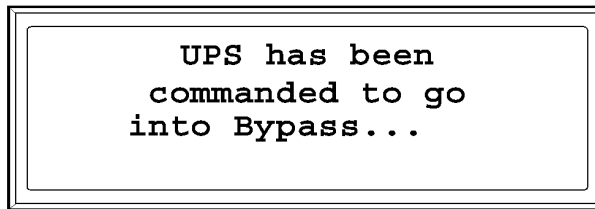


Verify proper phasing

1. Place the Symmetra 3-Phase UPS into Static Bypass mode:
 - a. Move the selection arrow on the Main menu to the **Control** item and press the ENTER key.



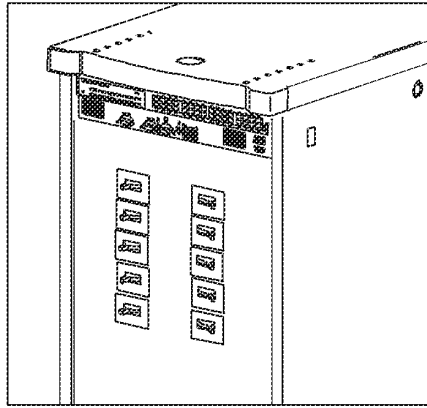
- b. Move the selection arrow on the Control menu to the **UPS into Bypass** item and press the ENTER key.
 - c. Confirm the selection on the next screen: move the selection arrow to the **Yes, UPS into Bypass** item and press the ENTER key. The BYPASS LED will illuminate and the display will show the following two screens:



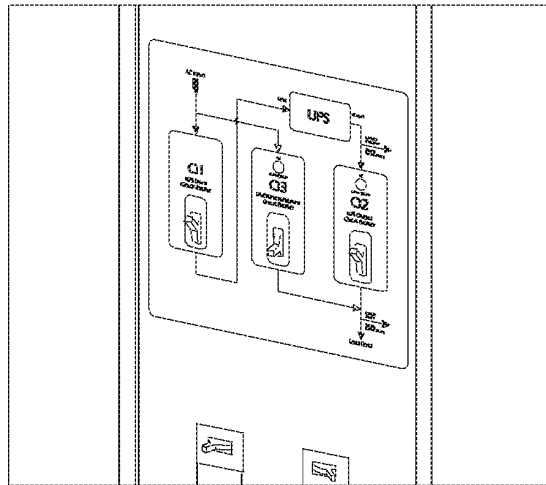
2. Check between the Q1 and Q2 breakers that there is no difference in potential between L1 in and L1 out, L2 in and L2 out, and L3 in and L3, using a True RMS voltmeter.

Power the PDU distribution breakers

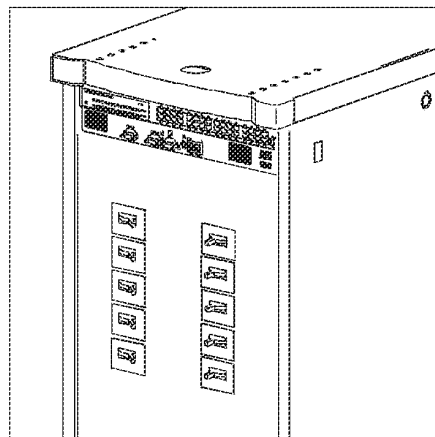
1. Make sure all breakers are open on the PDU with System Bypass distribution panels.



2. Close the Q2 breaker on the PDU. After Q2 has been closed, both distribution panels on the PDU with System Bypass will be energized.



3. Apply power to the PDU with System Bypass power cords (whips) by closing the distribution breakers on the PDU with System Bypass.



Communication Connection

PowerStruXure System	77
Connect network cables to PowerStruXure devices	77
Route network cables to the Information Controller Hub	77
Install and route data cables (alternative routing)	79
Connect the Information Controller and Hub.	79
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Configure the Image Map.	82
Configure initial settings on the Information Controller	82
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Verify the address assignment	86
Enable RMS	86

PowerStruXure System

Connect network cables to PowerStruXure devices

1. Connect a Cat-5 network cable (provided) to the Network ports on the Network Management Cards. The following devices have Network Management Cards:
 - Automatic Transfer Switch
 - Symmetra PX UPS
 - Environmental Monitoring Unit
2. Connect network cables (provided) to the 10Base-T ports on the Rack-mount PDU and on the PDU with System Bypass.

Route network cables to the Information Controller Hub

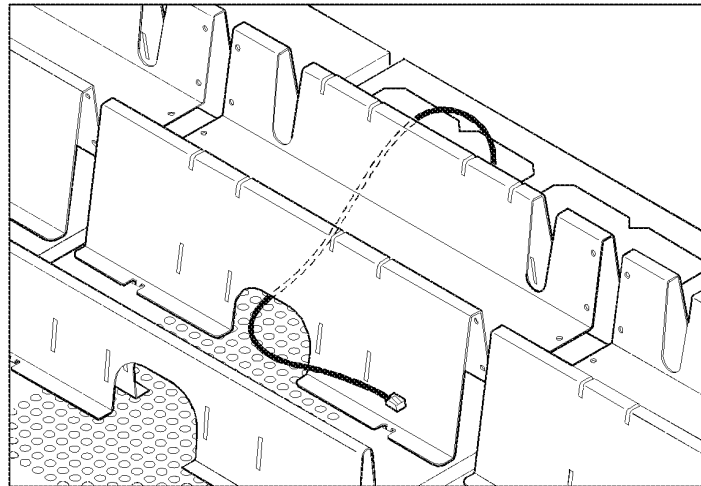
Overhead routing.

1. Install data cable troughs and ladders.



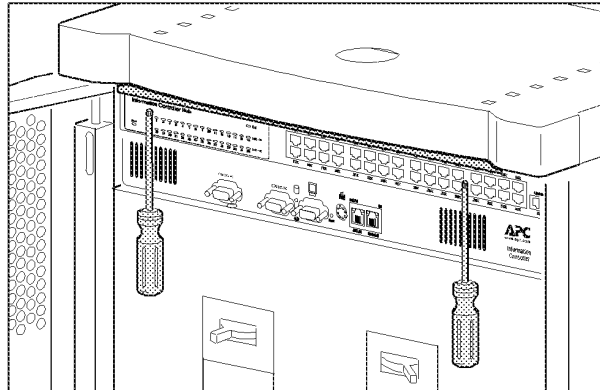
For instructions on how to install cable troughs and ladders, see “Cable Troughs and Ladders” in the Installation section.

2. Run the Cat-5 network cables (supplied) from each APC device to the Information Controller Hub in the top of the PDU with System Bypass.
 - a. Start with the device furthest from the PDU with System Bypass, and use the longest supplied Cat-5 cable.
 - b. Bundle cables together and run the bundles in the data cable troughs along rows and across ladders, if necessary.

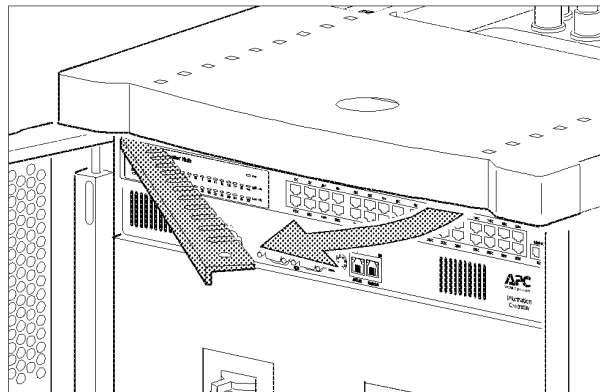


3. At the PDU with System Bypass:

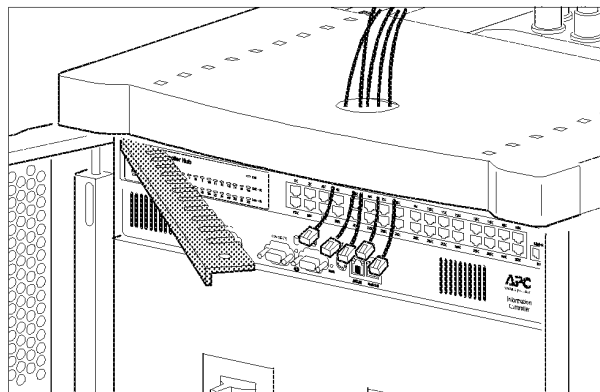
- a. Remove one of the two screws in the comb inside the PDU with System Bypass, and loosen the second screw.



- b. Swing the comb outward.



- c. Route all the data cables through the opening (under the trough) and into the enclosure.



- d. Press each data cable into a slot in the comb, leaving enough cable below the comb to allow you to plug it into the Information Controller Hub.
 - e. Reinstall the comb into the PDU with System Bypass.
4. Connect each APC device's network cable to any available station port in the Information Controller Hub. Station ports are those with an x after the number (e.g., 2x).

Install and route data cables (alternative routing)



APC strongly recommends routing data cables overhead, as described in “Overhead routing” on page 77. Using APC data cable troughs and ladders is the best way to ensure that data transmission for your PowerStruXure system is free from the danger of induced voltages.

If you choose to route data cables under a raised floor, note the following precautions:

- Do not route data cables inside the PDU with System Bypass to the floor, either within the power cable conduit or in any other location. Induced voltages from the power cables may interfere with correct data transmission. You must route data cables out the roof of the PDU with System Bypass and down inside the first NetShelter VX Enclosure to the floor.
- Induced voltages can also create problems under the floor when data cables run too close to any power cables. Even if data transmission is successful after the initial installation, later additions to power cabling under the floor for other equipment in your data center can jeopardize the integrity of the data transmission for your PowerStruXure system.

1. Apply power to all devices connected to the Information Controller Hub.
2. After both the Status and Link LEDs on each connected Network Management Card have turned green, continue with the connection procedure.



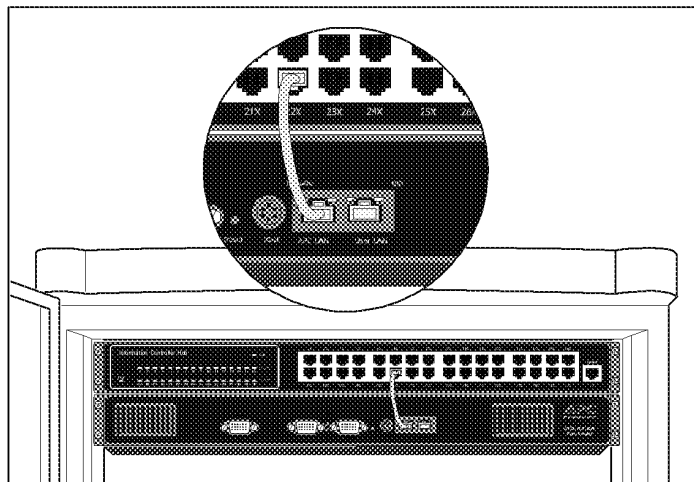
See “Connect the Information Controller and Hub” on page 79 to continue the connection procedure.

Connect the Information Controller and Hub

1. Connect the Information Controller’s **APC LAN** port to any station port on the Information Controller Hub, using the Cat-5 network jumper cable (provided).

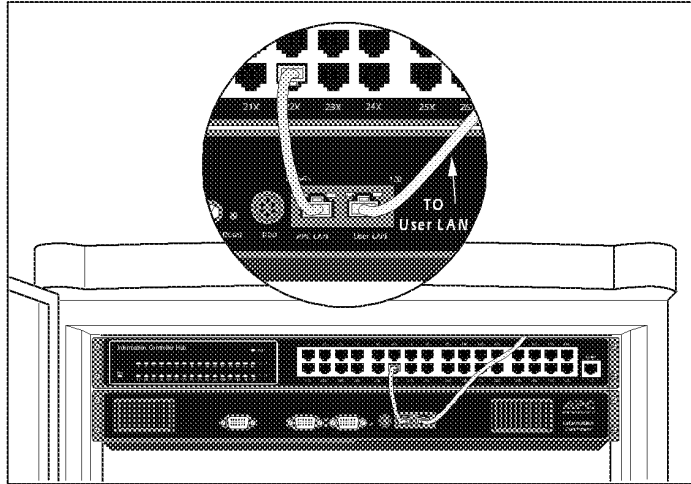


Station ports are those with an *x* after the number (e.g., 2x).



Connect the Information Controller to your LAN

1. Connect a port on your LAN to the Information Controller's User LAN port.



2. Access the APC LAN.



See the instructions in "Access the APC LAN" on page 80.



Note

You can access the Information Controller APC LAN and configure initial settings before you have your network set up.

Access the APC LAN

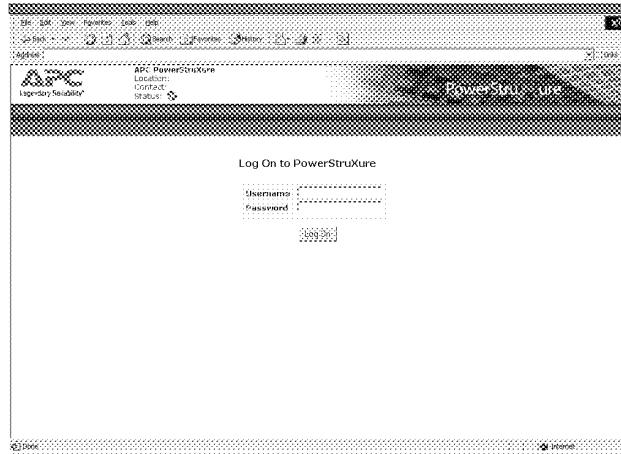
1. Connect a laptop to one of the station ports on the Information Controller Hub, using a Cat-5 network cable. Your laptop must meet the following requirements:
 - It must be configured to automatically obtain an IP address (via DHCP)
 - It must have a 10Base-T compatible ethernet card
 - It must be running TCP/IP as a network protocol
 - The browser must be Internet Explorer 5.5 or higher
 - Your browser should have Java Script enabled
 - Internet Explorer security cannot be set on *high*
2. On the proper adaptor, release and renew your laptop's IP address:



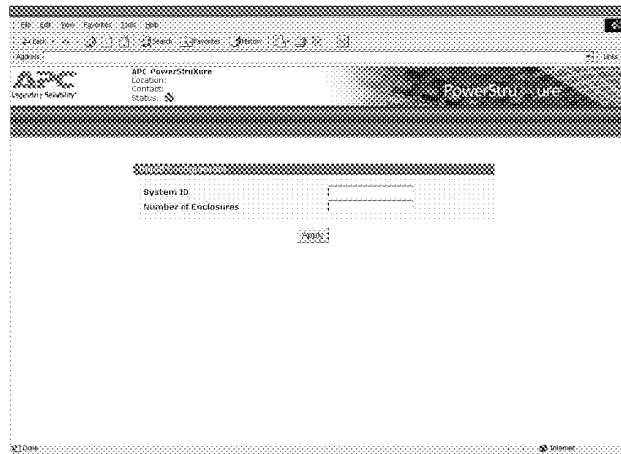
Note

The Information Controller will assign your computer one of its private IP addresses.

3. Access the Information Controller's local interface by opening your browser (Internet Explorer 5.5 or higher) and entering the following IP address: 192.168.1.1
4. Log on to the Information Controller, using the APC default username (apc, lowercase) and password (apc, lowercase).

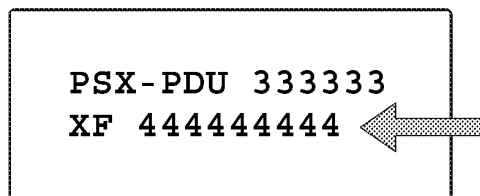
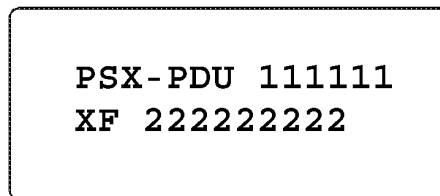


When you first log on to the Information Controller, you will see an initial configuration screen.



To proceed from this screen, you will need the following:

- The **System ID** — printed on a label on the front panel of the PDU with System Bypass. The System ID is the bottom number on the bottom label. The figure below is an example of the two labels on the PDU with System Bypass; the arrow points to the **System ID**.



- **Number of enclosures** — the total number of enclosures in your PowerStruXure system: Symmetra PX UPS, PDU with System Bypass, and NetShelter VX (device) enclosures
- 5. Continue the set-up by configuring the Information Controller's initial settings.



See “Configure initial settings on the Information Controller” on page 82.

Configure the Image Map.

1. Go to the **Home** screen and select the **Image Map** tab.
2. Double-click on an enclosure and select the **Configure** tab.
3. Choose a graphical representation for the enclosure you have selected and click the **Apply** button.
(i.e. If Enclosure 1 is a UPS, choose the picture of the UPS.)
4. Continue steps 1–3 for each UPS, PDU with System Bypass, and NetShelter VX Enclosure.



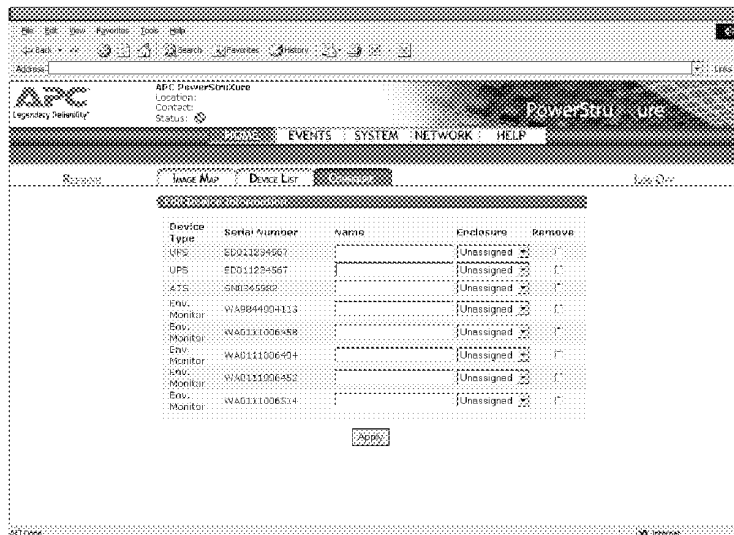
Note

Enclosures will remain defaulted to the enclosure picture. Pay close attention to Enclosure numbers

When you are finished, the Image Map should reflect your PowerStruXure system.

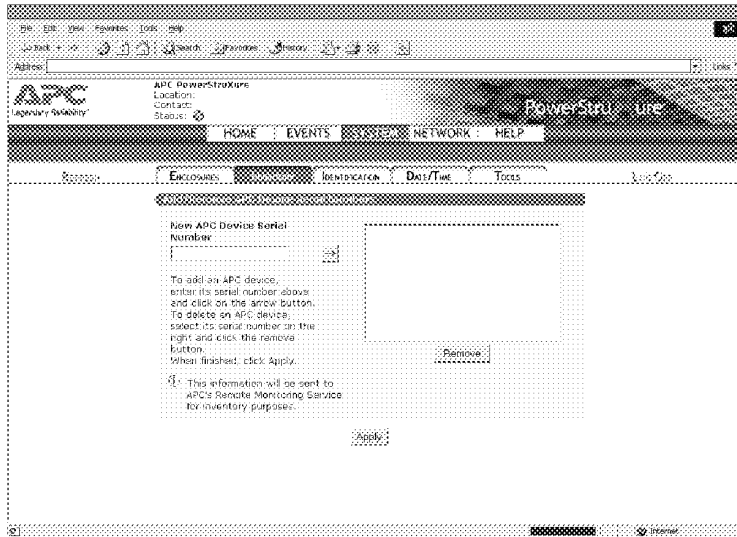
Configure initial settings on the Information Controller

1. Ensure that each installed Automatic Transfer Switch, Symmetra PX UPS, and Environmental Monitoring Unit is listed on the Information Controller Configure screen (see figure below).



2. On the Configure screen:
 - a. Assign each APC device listed to an enclosure.
 - b. Assign each UPS and PDU with System Bypass a number to match the way that you labeled them. (e.g. UPS 1, PDU with System Bypass 1, UPS 2, PDU with System Bypass 2, etc.)

- c. For each device, double click on the **Device ID**. Select **Configure** and change the *Device Name*.
3. Click on the **System** button on the Information Controller menu bar and click on the **Inventory** tab. On the Inventory screen, enter all APC device serial numbers that are not detected by the Information Controller (i.e., NetShelter VX Enclosures, PDU with System Bypass).



4. Click on the **System** button on the Information Controller menu bar and click on the **Identification** tab. On the Identification screen, perform the following:
 - a. Fill in all fields in the **PowerStruXure Information** text box.
 - The **Name** field should be the company name (e.g. APC PowerStruXure).
 - The **Location** field should be as specific as possible (e.g. Building 2 Room 6).
 - The **System ID** is printed on a label on the front panel of the PDU with System Bypass—the System ID is the bottom number on the bottom label.

- b. Fill in **all** fields in the **Contact Information** text box. (This information is used to create the main contact—RMS will contact this person for any event situations.)



Do not **Enable RMS** if the Information Controller is not connected to the user's LAN and an IP address is not yet assigned.

5. Assign an IP address to the Information Controller.



See “Assign an IP address to the Information Controller” on page 84.

Assign an IP address to the Information Controller

Assign an IP address to the Information Controller by following the applicable procedure:

If you are using DHCP on your user LAN... Your IT department should create a permanent DHCP lease for the IP address assigned to the Information Controller. You'll need this IP address to access the Information Controller from your User LAN.

1. Log off the Information Controller by clicking the **Log Off** link at the top right corner of the page.
2. Disconnect your laptop from the APC LAN port.
3. Verify the address assignment.



See “Verify the address assignment” on page 86.

If you are not using DHCP on your user LAN...

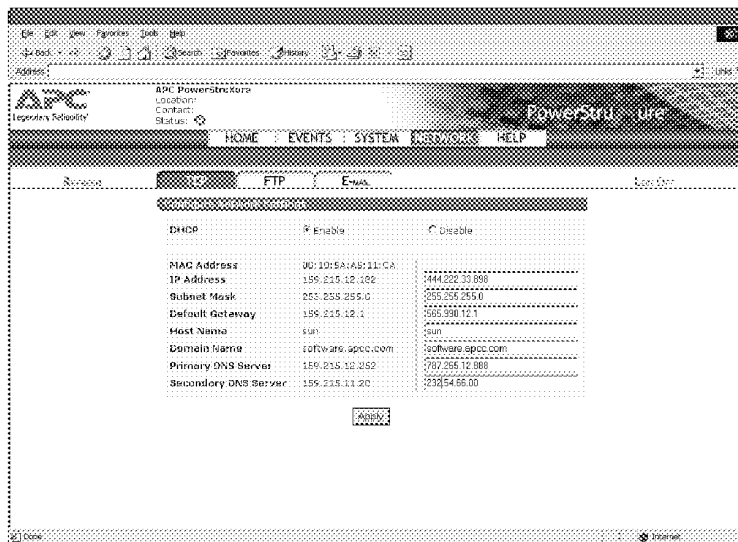
How to set a static IP address for the Information Controller:

1. Connect to the APC LAN, if you are not already connected.



See “Access the APC LAN” on page 80.

2. Select the **Network** tab and **disable DHCP** on the TCP tab. (See the next figure.)
3. Provide a User LAN IP Address, Subnet Mask, Default Gateway, Host Name, Domain Name, Primary DNS Server, and Secondary DNS Server. These items should be provided to you by your IT department. (See the figure below.)



4. Log off the Information Controller by clicking the **Log Off** link at the top right corner of the page.
5. Disconnect your laptop from the APC LAN port.
6. Verify the address assignment.



See “Verify the address assignment” on page 86.

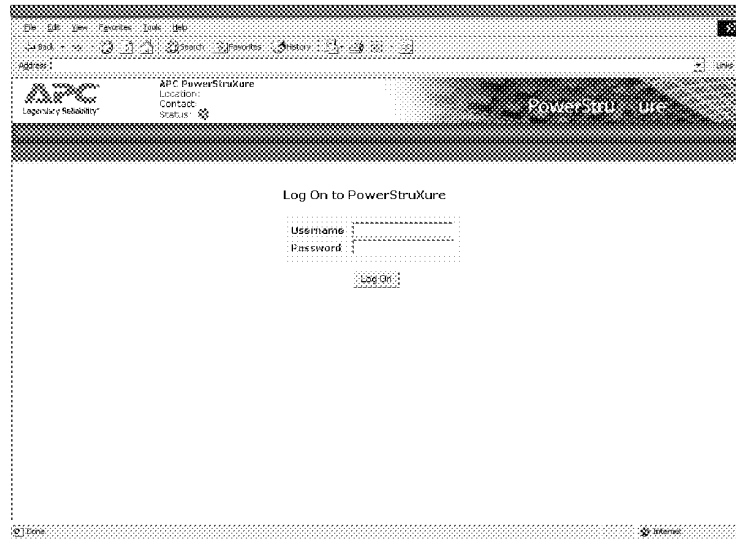
Verify the address assignment

1. From a computer on your user LAN, open a browser (Internet Explorer 5.5 or higher) and type in the IP address assigned to the Information Controller in the previous procedure (e.g., http://192.168.100.2).



Note

If you see the screen below, you have configured the Information Controller properly. If you do not see the screen below, check the IP address, verify that the link LED on the User LAN port is illuminated, check your browser version, and check all connections.



Enable RMS

1. Click on the **System** button on the Information Controller menu bar and click on the **Identification** tab. On the Identification screen, click the **Enable RMS** check box to enable RMS.
2. Call the APC Remote Monitoring Operations Center to ensure that they have received the registration e-mail.

RMS 24-Hour service: **1-636-300-2362**



Note

If RMS does not receive an e-mail, the user's LAN may have a firewall that prevents e-mail from being routed directly to RMS. In this case, the PowerStruXure customer must contact and speak to RMS directly to resolve the issue.

Configuration

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Metered Rack-Mount PDU

How to configure through a serial port connection

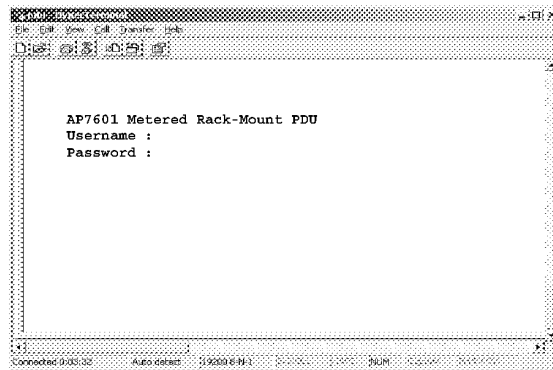
1. Connect an available serial port on your computer to the serial port on the front panel of the Metered Rack-Mount PDU, using the supplied configuration cable (p/n 940-0144).
2. Run a terminal emulation software program such as Windows® HyperTerminal.
3. Configure the appropriate serial port with the following settings:
 - 19,200 bps
 - no parity
 - 8 data bits
 - 1 stop bit
 - no flow control.



Note

Some terminal emulation software programs require that you disconnect and reconnect in order for the new serial port settings to take effect.

4. Press any key on your computer to bring up the Metered Rack-Mount PDU login menu.

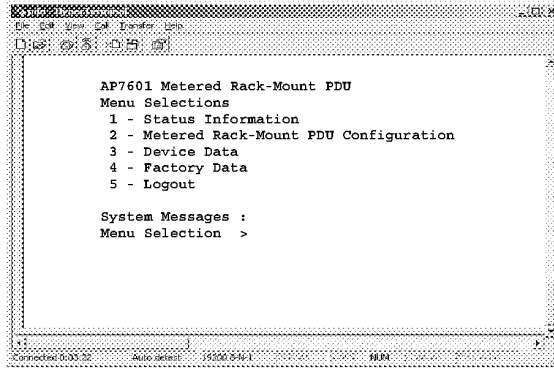


5. Type the default username and password for the appropriate level of access:
 - **Administrator**
 - Username: type apc
 - Password: type apc (lowercase)
 - **User**
 - Username: type apc
 - Password: press ESC

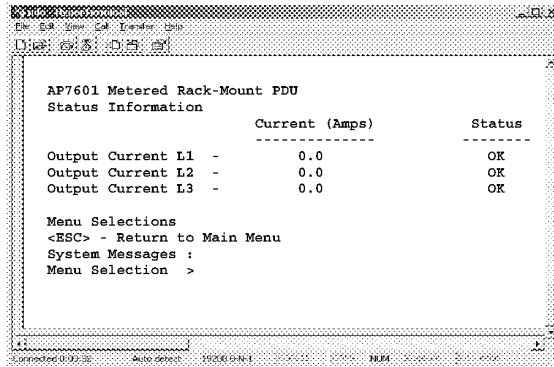
The Main menu will appear. See “User menus” on page 90 or “Administrator menus” on page 92 for more information on the menus.

User menus

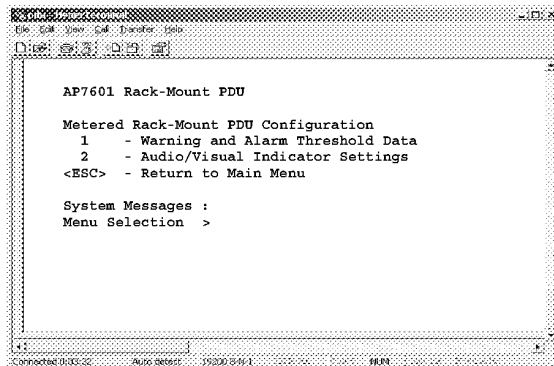
Main menu. When accessed by a user, the Main menu lists the Status Information, Configuration, Device Data, and Factory menus. Users can access—but not configure—data on these menus. To view a menu, type the associated number and press ENTER.



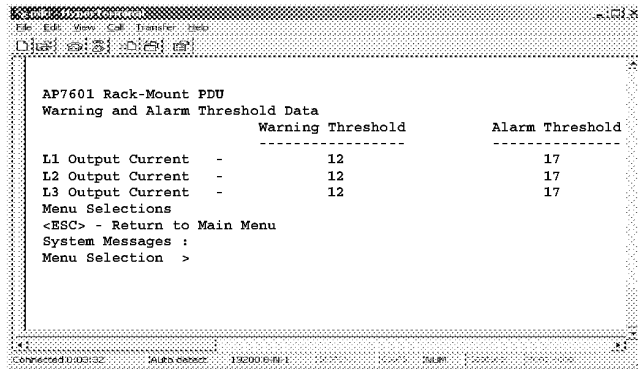
1: Status Information. The user Status Information menu displays the present current readings for each phase from the Metered Rack-Mount PDU and whether the Metered Rack-Mount PDU load has reached or exceeded the configured limits for output current.



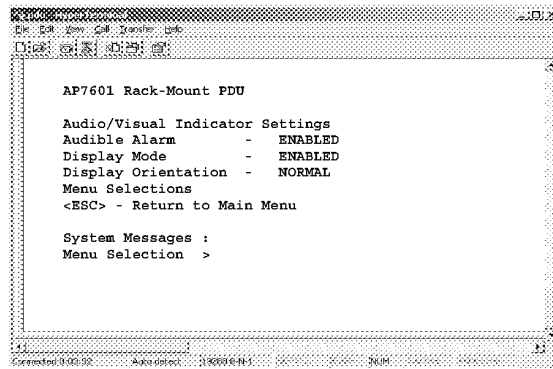
2: Metered Rack-Mount PDU Configuration. Users can view the configuration settings for the Metered Rack-Mount PDU. Type 1 and press ENTER to see the warning and alarm data for current. Type 2 and press ENTER to see the audio alarm and digital display settings.



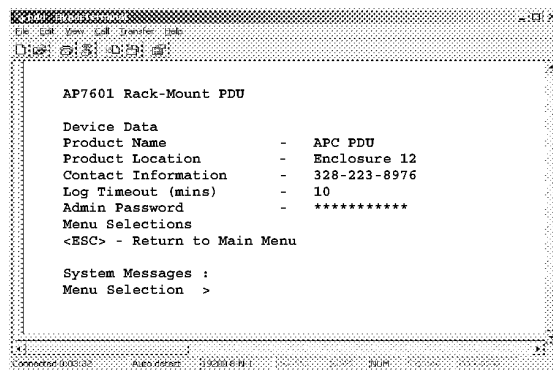
2-1: Warning and Alarm Threshold Data. Users can view the warning and alarm threshold settings for output current. Each setting is given for all three phases.



2-2: Audio/Visual Indicator Settings. Users can view the present settings for the audio alarm and digital display.



3: Device Data. Users can view the configured device data about the Metered Rack-Mount PDU. All data is configured by an administrator. The device data helps to keep track of the Metered Rack-Mount PDU.



4: Factory Data. Users can view the Factory Information, which provides detailed manufacturing data about the Metered Rack-Mount PDU.

```
AP7601 Rack-Mount PDU
Factory Information
Model # - AP7601
Serial # - 23458765
Hardware Rev - 1.0
Manufacture Date - 11/28/2001
Firmware Rev - 1.0
Firmware Date - 10/22/2001
Menu Selections
<ESC> - Return to Main Menu

System Messages :
Menu Selection >
```

Administrator menus

Main menu. When accessed by an administrator, the Main menu lists all Metered Rack-Mount PDU menus. Administrators can access all data and configure all items. (Users cannot configure any items on the menus.) To access a menu, type the associated number and press ENTER.

```
AP7601 Metered Rack-Mount PDU
Menu Selections
1 - Status Information
2 - Metered Rack-Mount PDU Configuration
3 - Device Data
4 - Factory Data
5 - Logout
6 - System Management

System Messages :
Menu Selection >
```

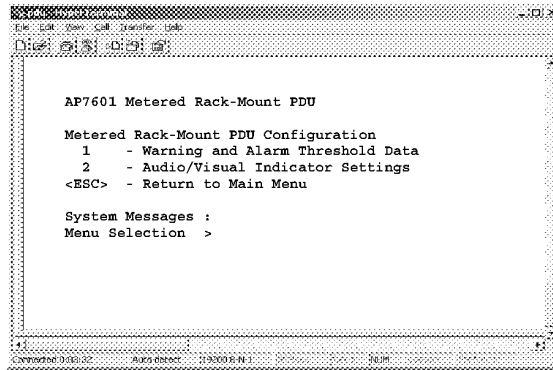
1: Status Information. The administrator Status Information menu displays the present current readings for each phase from the Metered Rack-Mount PDU, and whether the Metered Rack-Mount PDU has reached or exceeded the configured limits for output current.

```
AP7601 Metered Rack-Mount PDU
Status Information
Current (Amps)      Status
-----
Output Current L1 - 0.0      OK
Output Current L2 - 0.0      OK
Output Current L3 - 0.0      OK

Menu Selections
<ESC> - Return to Main Menu

System Messages :
Menu Selection >
```

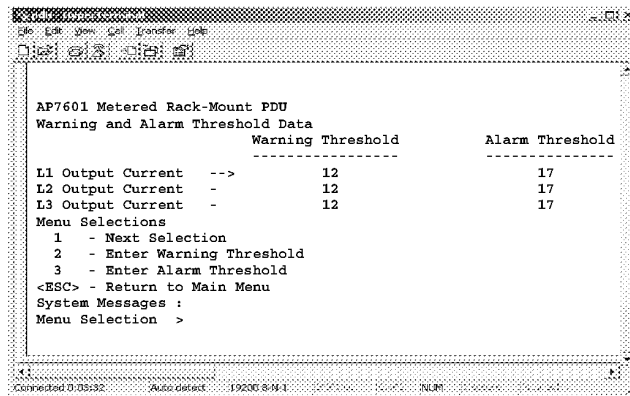
2: Metered Strip Configuration. The administrator of the Metered Rack-Mount PDU can configure warning, alarm, and indicator settings. To select a configuration menu, type the number of the desired selection and press ENTER.



2-1: Warning and Alarm Threshold Data. The Warning and Alarm Threshold Data menu displays the present settings for output current warnings and alarms, and allows configuration of those settings. To change a setting:

- a. Type the appropriate number of the setting listed on the menu.
- b. Press ENTER.
- c. Type the new amount for the setting you selected.
- d. Press ENTER.

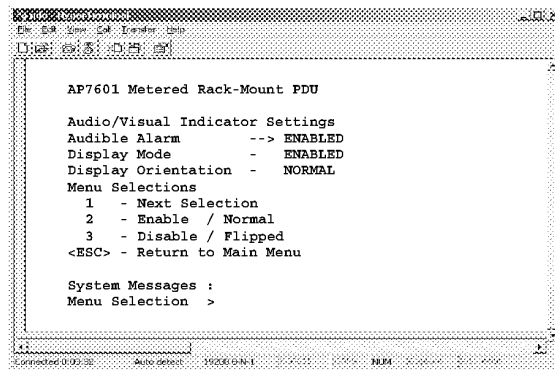
The change appears immediately in the top alarm and warning data list.



2-2: Audio/Visual Indicator Settings. The Audio/Visual Indicator menu displays the present settings for the audio alarm and digital display, and allows configuration of those settings. To change a setting:

- a. Type 1 and press ENTER until the arrow cursor reaches the desired setting.
- b. Type 2 and press ENTER to make a change to the setting.
- c. Type the number of the desired change and press ENTER. (The available settings and their associated numbers are listed after the **System Messages** item.)

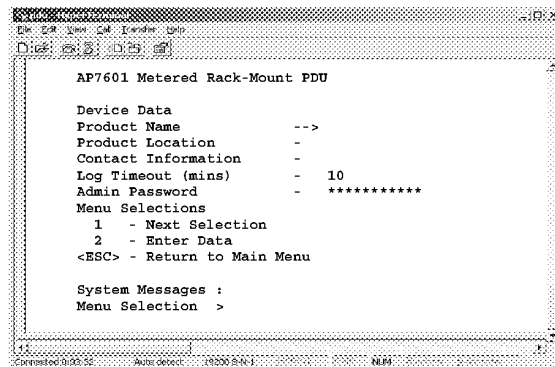
The change takes place immediately.



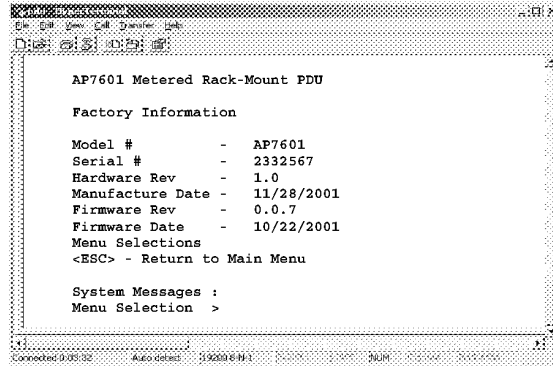
3: Device Data. The device data can help you keep track of the Metered Rack-Mount PDU by assigning a unique name for the device, a contact number or name, and the enclosure in which it is housed. To change a device data item:

- a. Type 1 and press ENTER until the arrow cursor reaches the desired item.
- b. Type 2 and press ENTER to make a change to the item.
- c. Type the new value (numbers or letters) and press ENTER.

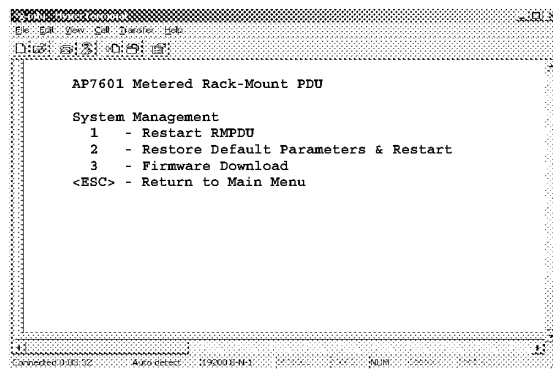
The change takes place immediately.



4: Factory Data. View detailed manufacturing data about the Metered Rack-Mount PDU.



6: System Management. Select the desired item and press ENTER. Changes take affect immediately. For firmware downloads, follow the instructions on-screen or see "How to download firmware revisions to the Metered Rack-Mount PDU" on page 161.



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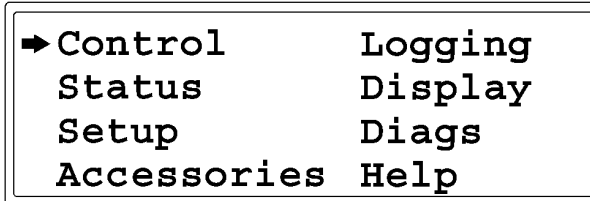
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System Operation

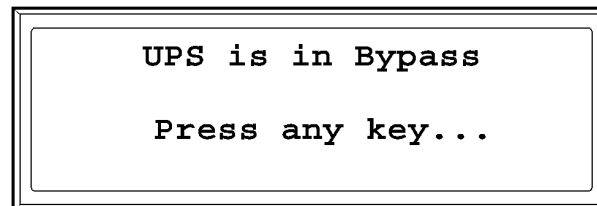
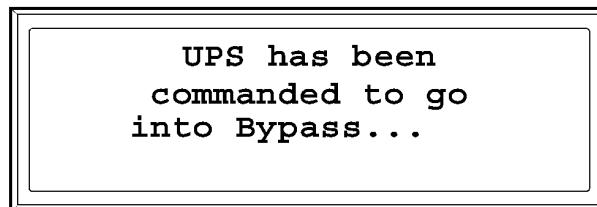
How to place the UPS into maintenance bypass operation

Place the system into maintenance bypass operation when servicing the UPS. When in maintenance bypass operation, power flows directly from the utility to the PDU and out to the load equipment.

1. Command the Symmetra 3-Phase UPS into static bypass through the Symmetra 3-Phase UPS display interface:
 - a. Press the ESC key at the Monitoring screen to open the Main menu. This menu allows access to eight submenus:



- b. Move the selection arrow to the **Control** item and press the ENTER key.
- c. Move the selection arrow on the Control menu to the **UPS into Bypass** item and press the ENTER key.
- d. Confirm the selection on the next screen: move the selection arrow to the **Yes, UPS into Bypass** item and press the ENTER key. The BYPASS LED will illuminate and the display will show the following two screens:



Note

The H3 LED above the Q3 breaker should illuminate, indicating that it is safe to operate the Q3 breaker.

2. Close Q3 breaker on the PDU with System Bypass.



Note

The H2 LED above the Q2 breaker should illuminate, indicating that it is safe to operate the Q2 breaker.

3. Open the Q2 breaker on the PDU with System Bypass.
4. Turn the System Enable switch on the Symmetra 3-Phase UPS to the off position.

5. Open the DC Disconnect breaker on the Symmetra 3-Phase UPS.
6. Open the Q1 breaker on the PDU with System Bypass.



Note

After you have finished these steps you are now in maintenance bypass operation and you can service the Symmetra 3-Phase UPS without affecting your connected equipment.

How to return from maintenance bypass operation

1. Close the Q1 breaker on the PDU with System Bypass.
2. Close the DC Disconnect breaker on the Symmetra 3-Phase UPS.
3. Turn the System Enable switch on the Symmetra 3-Phase UPS to the On position.



Note

As soon as you close the DC Disconnect breaker and turn the System Enable switch to the On position, the UPS comes up in static Bypass with the load on.



Note

The H2 LED above the Q2 breaker should illuminate indicating that it is safe to operate the Q2 breaker.

4. Close the Q2 breaker on the PDU with System Bypass.



Note

The H3 LED above the Q3 breaker should illuminate, indicating that it is safe to operate the Q3 breaker.

5. Open Q3 breaker on the PDU with System Bypass.

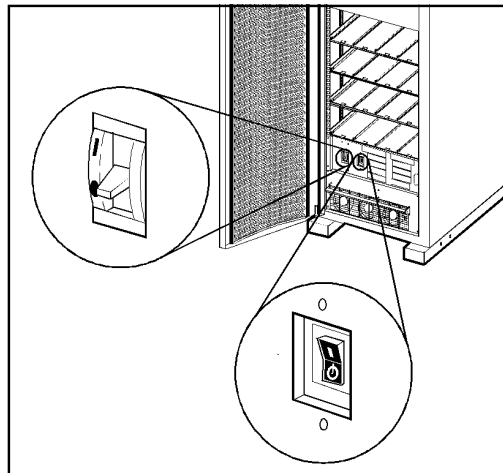


Note

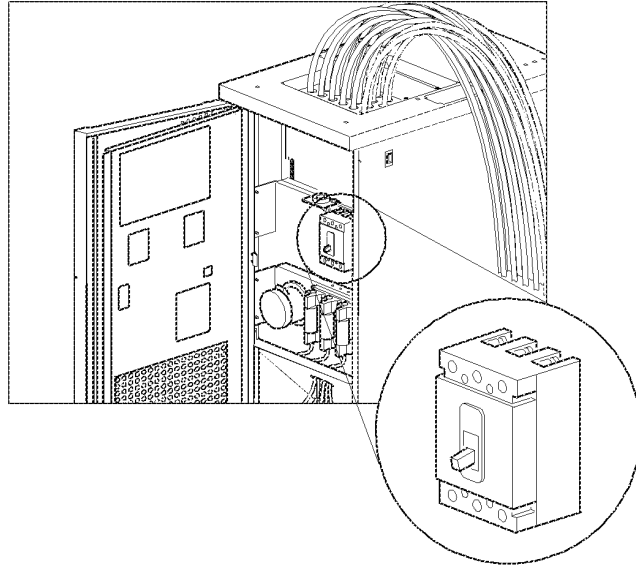
As soon as you open the Q3 breaker, the UPS will automatically come out of Static Bypass.

Total power off procedure

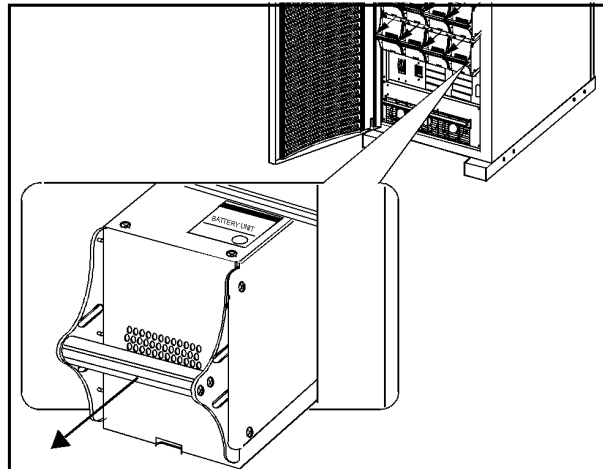
1. Open the DC breaker and turn off the System Enable switch on the Symmetra 3-Phase UPS.



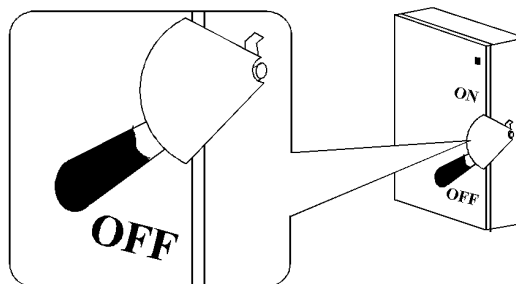
2. Open the Main input circuit breaker on the PDU with System Bypass.



3. Open the DC Disconnect breaker of each XR Battery Cabinet.
4. Disconnect the batteries in the Symmetra 3-Phase UPS by pulling them out approximately one inch (25.4 mm) from their normal position.



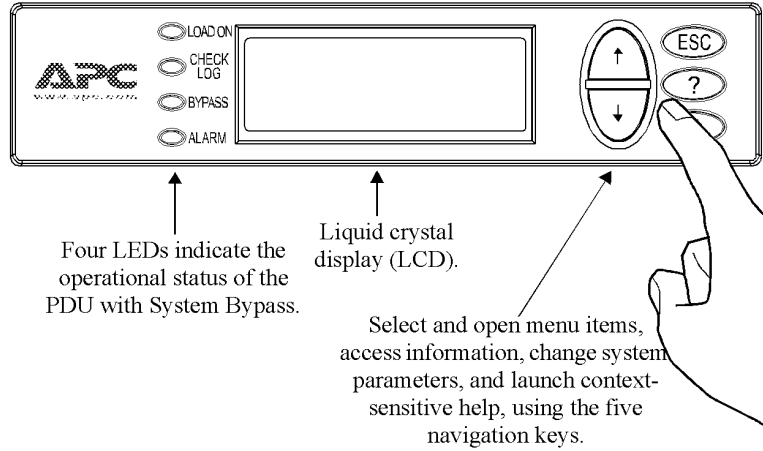
5. Set utility power to the Off or Locked Out position.



PDU with System Bypass

Display interface

You can use the display interface of the PDU with System Bypass to configure settings, set alarm thresholds, and provide audible and visual alarms.



LEDs

LED	Color	Status
LOAD ON	Green	The PDU with System Bypass is supplying conditioned power to the load equipment.
CHECK LOG	Yellow	At least one new alarm condition has been detected.
BYPASS	Yellow	Power to the load is being supplied directly by the mains power source. The UPS has been removed from the circuit for maintenance or replacement. Bypass breakers on the PDU with System Bypass function as input breakers to protect the load equipment.
ALARM	Red	An alarm condition exists.

Top-level status screens

After displaying a brief start-up screen after system start-up, the display interface scrolls automatically and continuously through four screen of basic status information.

Volts In	Volts Out
L1-2: 112	L1: 112
L2-3: 114	L2: 112
L3-1: 116	L3: 112

Status Screen 1

Load Current	
L1: 000	Neut: 000
L2: 001	
L3: 000	Gnd: 00.0

Status Screen 2

Total Output Loading	
KW: 000.0	PF: 0.00
KVA: 000.0	%LD: 000
Freq: 60.0	


Status Screen 3

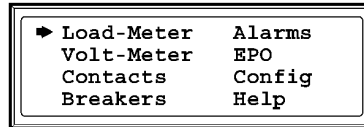
Active Alarm: 01of11
Input Transformer
Temperature Too High

Status Screen 4

Press the UP and DOWN   keys to interrupt the automatic scrolling to view a specific status screen.

Top-level Menu screen

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






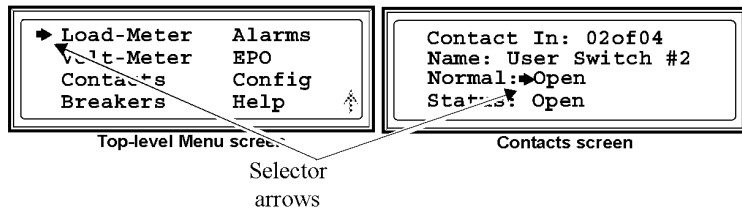
Option	Tasks
Load-Meter	Monitor the load that the PDU with System Bypass is supporting, by phase or in summary.
Volt-Meter	View the input and output voltage data for the PDU with System Bypass.
Contacts	Configure settings and monitor the present status for any contacts set up on the PDU with System Bypass monitoring unit.
Alarms & Logging	Configure alarm settings and view recent and active alarms.
Config	<ul style="list-style-type: none"> Configure setup preferences for your display interface. Configure settings for the PDU with System Bypass and for your network. Set the characteristics of the electrical service that provides input to the PDU.
Help	Obtain help about selected topics and procedures.









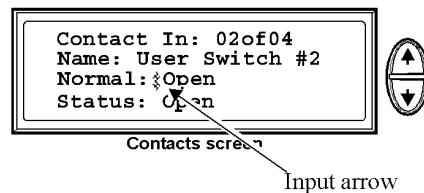
Note



If the display interface is inactive for the time specified as the **Time-out** setting of the System **Password** option on the **Config** screen, the interface reverts to the initial basic monitoring screens. See “System Password” on page 112.

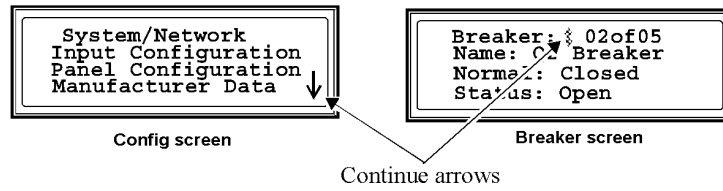
To open any screen, press the UP and DOWN   arrow keys until the selector arrow rests next to your desired selection. Press the ENTER  key to view the selected screen.



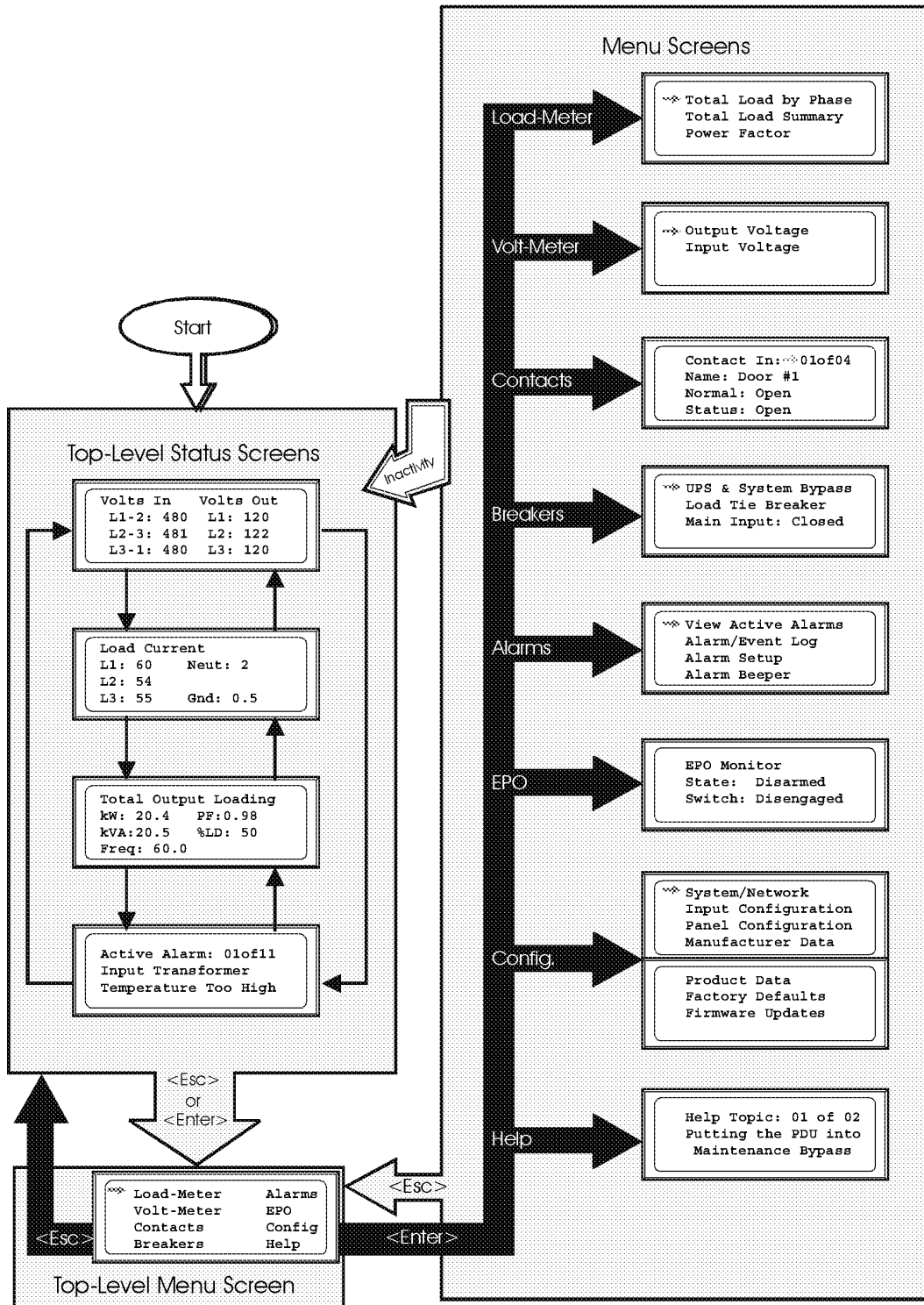
When configuring settings, press the UP and DOWN   keys until the selector arrow rests next to the setting you want to change and press the ENTER  key. If the setting is a list of choices, an input arrow will appear next to the setting. Press the UP and DOWN   keys until your desired change is listed. Press the ENTER  key to and change to the setting.



On the Config screen and the Breaker screen, continue arrows indicate that there are additional screens to view in the category. Press the UP and/or DOWN   keys to view the additional screens.



Screen map: PDU with System Bypass



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Load-Meter screen

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

Total Load by Phase The load supported by each phase in kVA, in RMS current (**I_{rms}**), and as a percentage of the breaker rating (**%LD**).

Total Load Summary For the total load supported:

- **kW**: The power provided, in kilowatts
- **kVA**: The actual power drawn by the load, in kilovolt-amperes
- **Freq**: Frequency
- **PF**: The power factor, which affects the power available to the load.
- **%LD**: KVA as percentage of:
Nominal Voltage × Output Breaker Rating × 3
Example:
 $100\% = 120V \times 150A \times 3 \text{ phases} = 54KVA$

Power Factor For each phase:

- **kVA**: The actual power drawn by the load, in kilovolt-amperes (kVA).
- **kW**: The power, in kilowatts provided by the phase.
- **PF**: The power factor (kW/kVA), which affects the power available to the load.

Volt-Meter screen

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

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

Contacts screen

Use the **Contacts** screen to display and configure information on the contact inputs (dry contacts).

Contact In Scroll through the list to display information about each of the installed contact inputs. For example, **02of04** displays information about the second of four installed contact inputs.

Name The name of this contact input.
Maximum: 14 alphanumeric characters

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

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



See “How to connect contacts to the PDU monitoring unit” in the Customization section for instructions on how to connect contacts.

Breakers screen

Use this screen to view the status of the system and PDU with System Bypass breakers.

UPS & System Bypass Reports the operation mode of the UPS and the state of the PDU with System Bypass Q1, Q2, and Q3 breakers.

Load Tie Breaker Reserved for future enhancement.

Main Input Reports status of PDU with System Bypass Main Input Breaker (**Open** or **Closed**). Under normal operation, this breaker will be **Closed**.

Alarms and Logging screen

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

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

- | | |
|----------------------------|--|
| New Logged Alarms | <p>Display a description and the date and time of each alarm that occurred since the last time this option was used.</p> <ul style="list-style-type: none"> • The most recent alarm is displayed initially. To move to the previous alarm, press the DOWN arrow key. To move to the next more recent alarm, press the UP arrow key. • If the log contains no alarms, the screen displays <code>Alarm Log Empty</code> and the system date and time.
The date/time format is <code>mmm-dd yyyy hh:mm:ss</code>. |
| Entire Log | <p>Display a description and the date and time of each alarm in the alarm log.</p> <ul style="list-style-type: none"> • The most recent alarm is displayed initially. press the DOWN arrow key. To move to the next more recent alarm, press the UP arrow key. • If the log contains no alarms, the screen displays <code>Alarm Log Empty</code> and the system date and time.
The date/time format is <code>mmm-dd yyyy hh:mm:ss</code>. |
| All Possible Alarms | <p>Display a description of each alarm that can occur. To move through the list, press the UP or DOWN arrow key.</p> |
| Clear Log | <p>Delete the contents of the alarm log.</p> |

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

- Loading Limits** Configure the following, in amps and as a percentage of full load:
- **Out High:** The upper limit for output current
 - **Out Low:** The lower limit for output current
 - **Out Neut:** The upper limit for current on the neutral wire for the output phases
- Voltage Limits** Configure the following, as a percentage under or over the rated voltage.
- **Input:** The allowed range for input voltage
 - **Output:** The allowed range for output voltage
- Other Limits** Configure these limits:
- **Frequency:** The frequency variation, in Hz, that is acceptable for the output current.
 - **Gnd Current:** The upper limit, in amps, for the current on the earth ground wire.
- Global Alarm Config** Set all the loading limits or all the voltage limits simultaneously as a percentage of full load:
- **Load Limits:** Set the same percentage for the upper limit for output current, the lower limit for output current, and the upper limit for current on the neutral wire for the output phases. (Use the **Loading Limits** option to set these thresholds individually).
 - **Volt Limits:** Set the same percentage for the high and low thresholds for input and output voltage. (Use the **Voltage Limits** option to set these thresholds individually).
- Select **Apply Now** and then **YES** to implement your changes.

Alarm Beeper. Use this option of the **Alarms** screen to access the following two options:

- Activate Beeper** Turn on the beeper if it has been previously deactivated by the **Silence All Alarms** option.
- Silence Alarms** Configure one of the following options:
- **Silence All Alarms:** Turn off the audible alarm for present and future alarms.
 - **Silence Active Alarms:** Turn off the audible alarm for the present alarm condition only. If the condition recurs, the alarm sounds again.

List of PDU Alarms

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

Alarm Condition	Explanation	Message When Condition Cleared.
Input V <Ln-N>=<Value> Voltage Under Limit	Input voltage of the phase indicated has dropped below the configured lower limit.	Input Voltage V <Ln-N> Back In Range
Input V <Ln-N>=<Value> Voltage Over Limit	Input voltage of the phase indicated exceeded the configured upper limit.	
Output V <Ln-N>=<Value> Voltage Under Limit	Phase-to-neutral output voltage for phase <L-N> dropped below the configured limit.	Output Voltage V <L-N> Back In Range
Output V <Ln-N>=<Value> Voltage Over Limit	Phase-to-neutral output voltage for phase <L-N> exceeded the configured limit.	
UPS In V <Ln-N>= <Value> Check Fuse <F<x>	The fuse feeding the UPS appears to be blown.	None
Output I L<n>=<Value> Current Over Limit	Current of output phase <N> exceeded the configured limit.	Output Phase <N> Current Within Limit
Output I L<n>=<Value> Current Under Limit	Current of output phase<N> dropped below the configured limit.	
Output Neut=<Value> Current Over Limit	Current on the neutral wire for the output phases exceeded the configured limit.	Output Neutral Current Within Limit
Output FDev=<Value> Freq Out of Range	Frequency of the output current is above or below the range that is configured as acceptable.	Output Frequency Back In Range
Earth Ground=<Value> Current Over Limit	Current on the earth ground wire exceeded the configured limit.	Earth Ground Current Within Limit
Input Transformer, <i>if applicable</i> Temperature Too High	The temperature of the PDU with System Bypass transformer exceeded the normal limit.	Input Transformer Temp. Back to Normal
Main Breaker Open Alarm Active	The Main input breaker is Off.	Main Circuit Breaker Has Been Closed
<User Contact Name> Alarm Active	A user-configured contact connected to the PDU monitoring unit is reporting an alarm condition.	Alarm Cleared
EPO Ready to Test	The EPO switch has been placed in TEST mode and is ready to test.	EPO Armed
No UPS Input Breaker Q1 Open	The Q1 is open and the PDU is not receiving power from the UPS.	None
No Panel Feed Breakers Q2&Q3 Open	The Q2 & Q3 circuit breakers are open and the PDU is not supporting connected equipment.	None
Atypical Bypass Mode Alarm Active	The system state as set by those Q1, Q2, & Q3 breakers is in a bypass mode.	None

EPO screen	EPO Monitor. Use this screen to view the status of the EPO switch.
State	Reports whether the toggle switch on the PDU Monitoring Unit is in the Armed or Test position. If the toggle switch is in Test position, you can engage the EPO switch without affecting power to the load equipment. If it is in the Armed position, engaging the EPO switch will terminate power to the load equipment.
Switch	Indicates whether the connected EPO switch is Engaged or Disengaged .
Config screen	System/Network. Use this option of the Config screen to access these options:
System Password	<ul style="list-style-type: none">• Password: Change the system password required to access protected screens and fields in the display interface. Enter a string of up to eight alphanumeric characters, followed by the underline character (_) to indicate the end of the string. The default password is APC.• Time-out: Set the time that the display interface waits for user input before it reverts to the initial scrolling of status screens. Select 1, 2, 5, 10 (the default), or 30 minutes; or 1, 2, or 4 hours, or Forever.• Invalidate NOW: Re-enter the system password for viewing password-protected screens.
Date/Time	<ul style="list-style-type: none">• Date: Set in the following format: <i>dd/mmm/yyyy</i>.• Time: Set in the following format: <i>hh:mm:ss</i>.
Local Interface	<ul style="list-style-type: none">• Contrast: Set the screen contrast for the LCD. Select from 1 (high contrast) to 8 (low contrast).• Key Click: Choose On for an audible click whenever you press a navigation key. Choose Off to disable the key click.• Beeper: Select High, Medium, Low, or Off to adjust the loudness of the audible beeper and the key click.
Network Address	The following values are set by the Information Controller during initial configuration: <ul style="list-style-type: none">• IP: The System IP address, which the domain name server translates into a domain name.• Mask: The subnet mask, which identifies the subnetwork on which the PDU with System Bypass operates.• MAC: The Media Access Control address. This is the physical address of the PDU with System Bypass, expressed as a 48-bit hexadecimal number.

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

Main Input	The voltage from building's electrical service coming into the PDU main input circuit breaker(s). <ul style="list-style-type: none">• 3W: 3-phase Delta, measured line-to-line• 4W: 3-phase WYE, measured line-to-neutral
Panel Breaker	The rating, in amps, of the breaker feeding the distribution panels.
Panel Voltage	The nominal voltage of the distribution panels supplying power to the load equipment. (This is measured line-to-neutral.)
Transformer	Indicates whether the PDU with System Bypass has a transformer.
Load Tie Breaker	Indicates whether the PDU with System Bypass has a Load Tie Breaker.
Load Test Port	Indicates whether the PDU with System Bypass has a Load Test Port.

Panel Configuration. This is reserved for a future enhancement.

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

- Manufacturer Name
- Date of Manufacture
- Date of Calibration
- Hardware Revision
- Firmware Revision (for PDU Monitoring and Metering)
- Serial Number
- Model Number

Product Data. Use this option of the **Config** screen to uniquely identify your PDU with System Bypass. The following fields can be configured:

Device Name	Set a unique name for your PDU with System Bypass.
Product Location	Name the physical location of the product in your data center.
Product Contact	Identify the person to notify concerning questions or problems with regard to the product.

Factory Defaults. Use this option of the **Config** screen to reset all PDU with System Bypass settings to their factory default values.

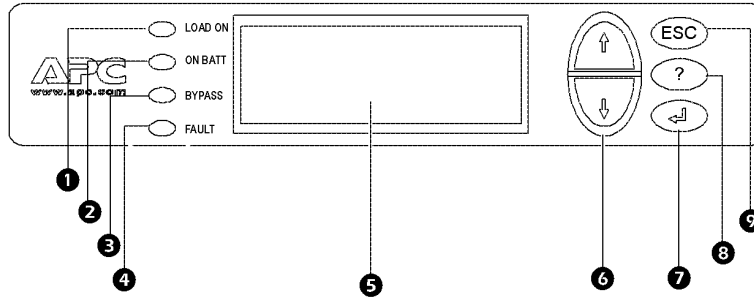
Firmware Updates. Use this option of the **Config** screen to download updated firmware to the PDU with System Bypass.

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Symmetra 3-Phase UPS

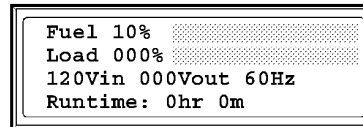
Display interface



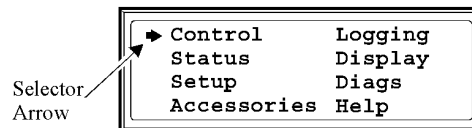
①	LOAD ON LED	When green, the Symmetra 3-Phase UPS is powering the load equipment.
②	ON BATT	When yellow, the Symmetra 3-Phase UPS is on battery operation.
③	BYPASS LED	When yellow, power to the load is being supplied directly by the utility power source. The UPS has been removed from the circuit for maintenance or replacement.
④	FAULT LED	When red, an alarm condition exists.
⑤	LCD	View alarms, status data, instructional help, and configuration items.
⑥	UP and DOWN navigation keys	Selects menu items and accesses information.
⑦	ENTER key	Opens menu items and input changes to system parameters.
⑧	HELP key	Launches context-sensitive help.
⑨	ESC key	Returns to previous screen displayed.

Navigating through screens

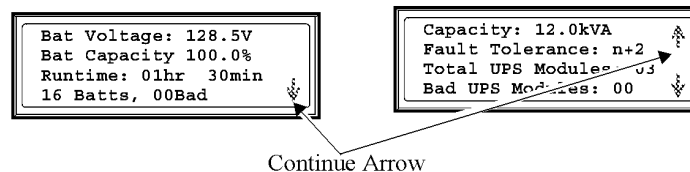
Press the ESC key until you reach the top-level Status screen providing you with basic system status information.



Press the ENTER key to open the top-level Menu screen. This screen is the launching pad to command, configure, and monitor the Symmetra 3-Phase UPS.



Press the UP and DOWN keys to navigate the continue arrow and view all sub menu screens.



Set-up functions

The display interface settings are set to factory defaults. For more information on the settings that you can change, refer to the Symmetra 3-Phase UPS product manual (in PDF) available on the Information Controller **Help** page or on our Web site at: www.apc.com/support.

Changing factory default settings



Basic troubleshooting

This Troubleshooting section will help you solve most problems using the Symmetra 3-Phase UPS display interface.



Note

If the display interface reports a problem, verify that the component in question is correctly installed in the Symmetra 3-Phase UPS. If the problem persists, follow the instructions in “How to Obtain Service” on page 167.

For advanced configuration, refer to the Symmetra 3-Phase UPS Product Manual on the Information Controller **Help** page or on our Web site at: www.apc.com/support.

General Status troubleshooting

Display Message	Meaning	Corrective Action
Input Freq outside configured range	The input frequency to the Symmetra 3-Phase UPS is outside the configured range. The output frequency will not synchronize with the input frequency. Normal bypass is not available.	<p>Option 1: Improve the frequency of the incoming voltage.</p> <p>Option 2: Widen the range of the acceptable incoming frequency using the display interface. (Startup-Setup-Output Freq Select.)</p> <p>Option 3: Proceed with startup—normal bypass is not available.</p>
AC adequate for UPS but not for bypass	The Symmetra 3-Phase UPS will function on-line with the input voltage, but in the event that bypass is required, the input voltage is not adequate to power the load equipment.	<p>Option 1: Improve the incoming voltage.</p> <p>Option 2: Proceed with startup—normal bypass is not available.</p>

Threshold Alarm troubleshooting

Display Message	Meaning	Corrective Action
Redundancy has been lost	The Symmetra 3-Phase UPS no longer detects redundant power modules. Either a power module(s) has failed, or the load has increased.	<p>Option 1: If possible, install additional power modules.</p> <p>Option 2: Decrease the load</p> <p>Option 3: Disable the redundancy alarm by setting redundancy to zero. (Startup-Setup-Alarms-Redundancy-select zero)</p>
Runtime is below alarm threshold	The predicted runtime is lower than the user-specified minimum runtime alarm threshold. Either the battery capacity has decreased, or the load has increased.	<p>Option 1: Allow the battery modules to recharge.</p> <p>Option 2: If possible, increase the number of battery modules.</p> <p>Option 3: Decrease the load.</p> <p>Option 4: Use the display to decrease the minimum runtime alarm threshold (Startup-Setup-Alarms-Runtime-select).</p>

Bypass troubleshooting

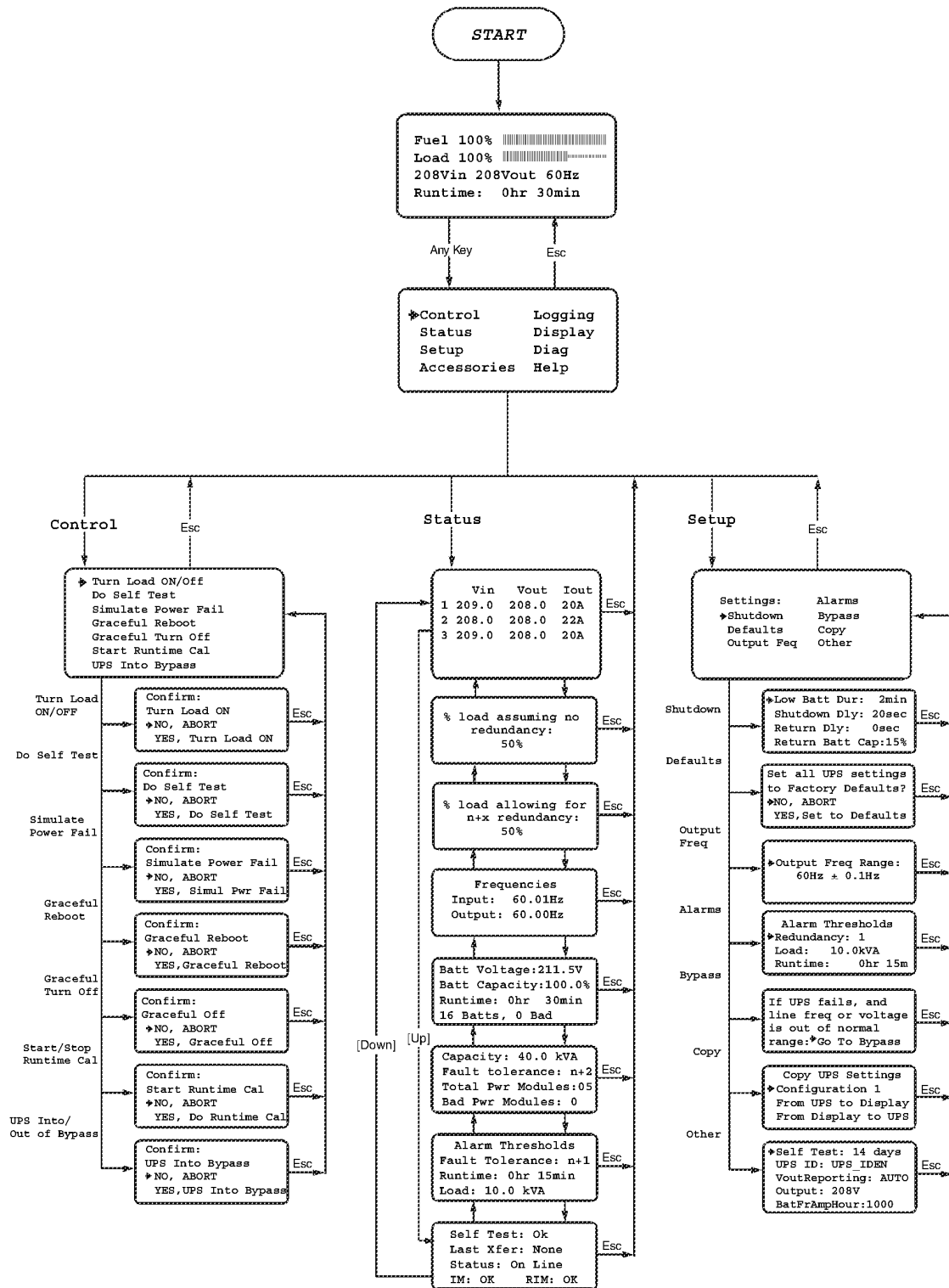
Display Message	Meaning	Corrective Action
Bypass is not in range (either freq or voltage)	The frequency and/or voltage is out of acceptable range for bypass. This message occurs when the Symmetra 3-Phase UPS is online, and indicates that the bypass mode may not be available if required.	<p>Option 1: Decrease the sensitivity to input frequency. (Startup-Setup-OutputFreq-select).</p> <p>Option 2: Correct input voltage to provide acceptable voltage and/or frequency.</p>

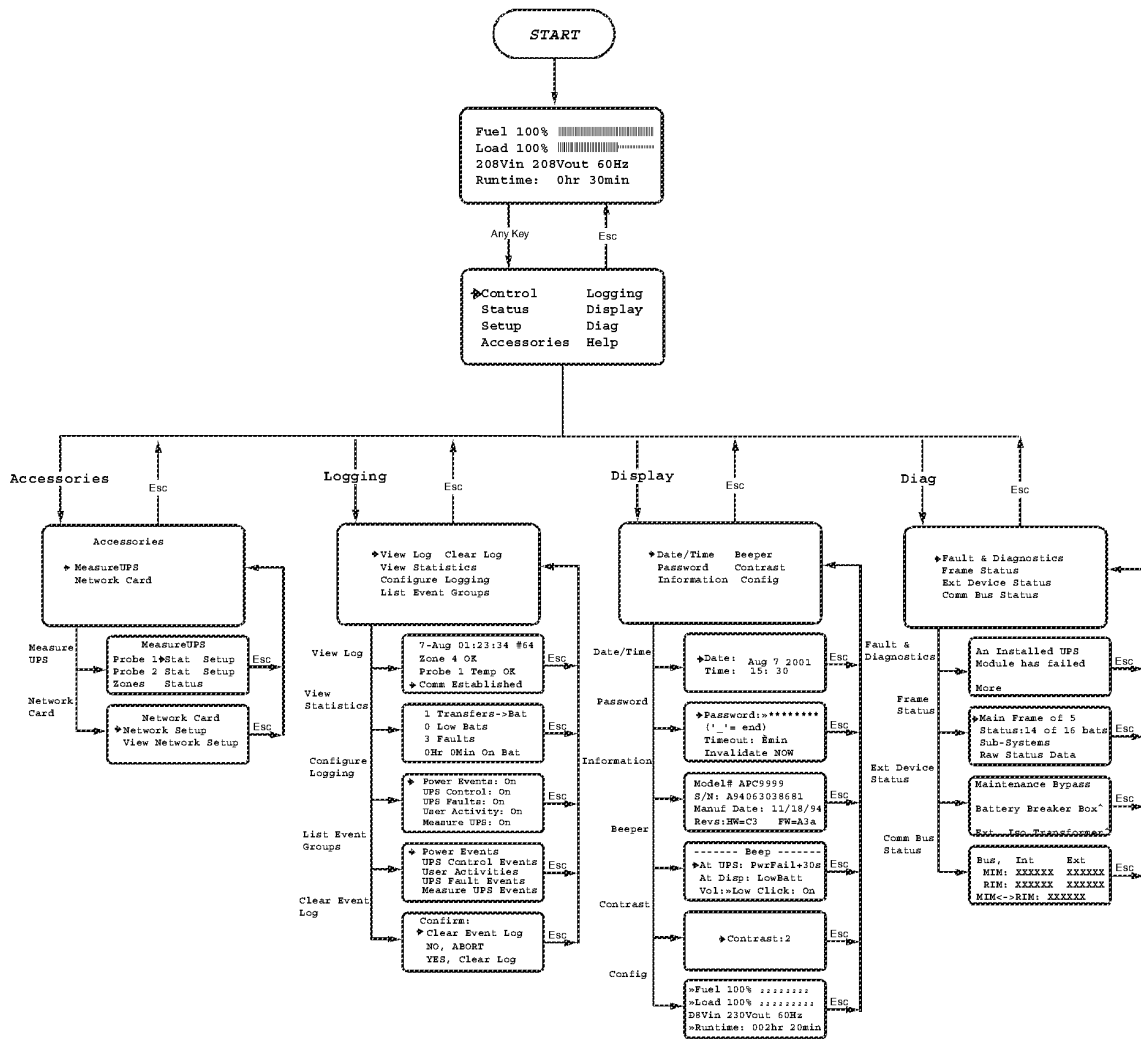
General Fault troubleshooting

Display Message	Meaning	Corrective Action
Need Bat Replacement	One or more battery units need to be replaced.	Refer to “How to replace a battery unit” on page 158 for more information.
The Redundant Intelligence Module is in control	The main intelligence module has failed, and the redundant intelligence module is functioning as the primary intelligence module.	Replace the main intelligence module. See “How to replace an intelligence module” on page 159 for more information.

Symmetra 3-Phase UPS display interface menus

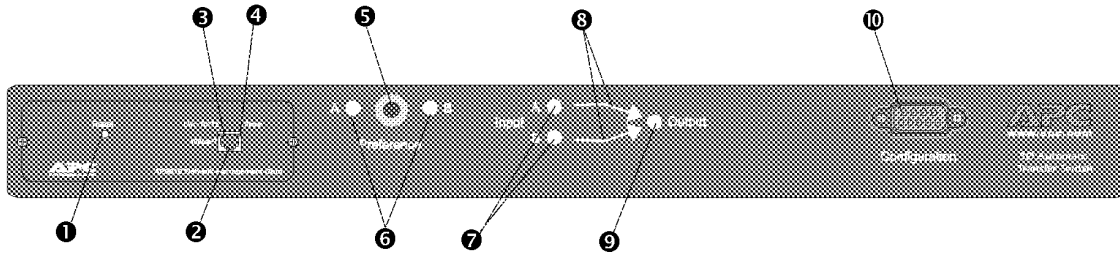
The following two figures show the display interface menus and the navigation path to each menu.





3-Phase Automatic Transfer Switch

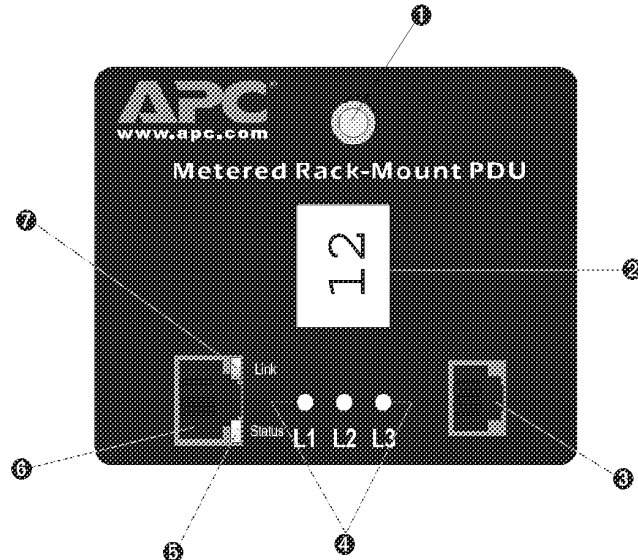
Front panel



No.	Item	Description/Function
❶	Reset switch	Resets the Network Management Card to its default settings. This switch does not affect the settings of the Automatic Transfer Switch.
❷	Ethernet Port	Connects the Automatic Transfer Switch to the Information Controller Hub, using an APC network cable (provided).
❸	Rx-Link LED	Indicates whether there is activity on the network.
❹	Status LED	Indicates whether the Network Management Card is powered on.
❺	Preference Selection button	Sets which power source will be the preferred source to supply power to the load equipment. In normal operation, if both sources are available, the Automatic Transfer Switch will use the preferred source. Press the Preference Selection button to change the preferred source.
❻	Preference A and B LEDs	Indicate which of the two sources (if any) is selected as the user's preferred source. Both LEDs off means that neither source is preferred.
❼	Source A and B LEDs	Provide information about the condition of the input voltages from both sources. If a source is considered OK, the corresponding indicator will light. A source is OK if the RMS input voltage on all three phases and the measured frequency are within the selected tolerance ranges. In a normal operating condition (full source redundancy), both LEDs are illuminated.
❽	Connector LEDs	Indicates which source is being used for the output. Only one arrow will be lit at any time. The combination of Source LEDs, Connector LEDs, and Output LEDs provide a graphical view of the power flow through the Automatic Transfer Switch.
❾	Output indicator	Shows that voltage is truly available at the output for the Automatic Transfer Switch.
❿	Configuration port	The local connection for accessing all the setup, status, maintenance and diagnostic information for the Automatic Transfer Switch.

Metered Rack-Mount PDU

Display interface



1	Control button <ul style="list-style-type: none"> press to change the phase of the current displayed on the digital display press and hold for five seconds to view the orientation; hold for an additional five seconds to change the orientation press to silence an alarm
2	Digital display† <ul style="list-style-type: none"> shows the current for the phase corresponding to the Phase Indicator LED that is illuminated cycles through all three phases in 3-second intervals
3	Serial port <ul style="list-style-type: none"> access internal menus by connecting this port (RJ-11 modular port) to a serial port on your computer, using the supplied serial cable (p/n 940-0144)
4	Phase indicator LEDs <ul style="list-style-type: none"> indicates the phase corresponding to the current listed in the digital display indicates normal (green), warning (yellow) or alarm (red) condition
5	Status LED <ul style="list-style-type: none"> reserved for future use
6	Ethernet port <ul style="list-style-type: none"> reserved for future use
7	Link LED <ul style="list-style-type: none"> reserved for future use

† Each Metered Rack-Mount PDU is equipped with a sensor that measures the current being used by the Metered Rack-Mount PDU and devices connected to it. The value displayed is the aggregate current of an individual phase. This value is used to generate alarms that you define. For information on configuring alarms, see “2-1: Warning and Alarm Threshold Data” on page 93.

Alarm conditions

The warning and alarm limits are configurable through the internal menus through a serial port connection. For instructions on accessing the internal menus, see “How to configure through a serial port connection” on page 89. The following table describes warning and alarm conditions.

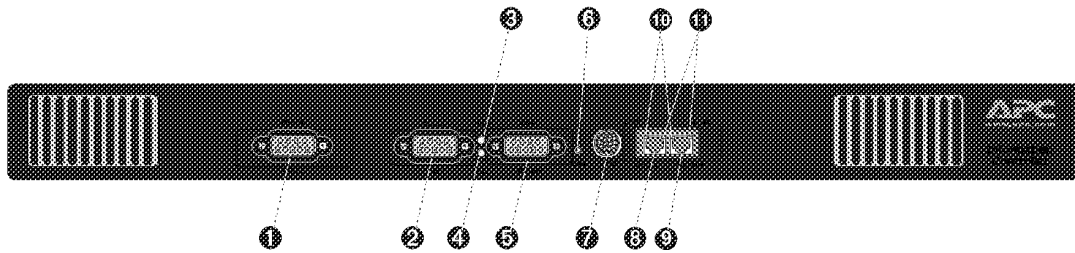
Behaviors During Alarm Condition		
Phase Indicator LED	Digital Display	Control Button
Yellow: warning Red: alarm	Shows the current for the phase at or above the warning or alarm limit.	<ul style="list-style-type: none">• Causes the digital display to show the current reading for the next phase• After 30 seconds of disuse, the display will return to the phase (or cycle among phases) at or above the warning or alarm limit.




Do not exceed the maximum voltage and current ratings listed on the rear panel of the Metered Rack-Mount PDU.

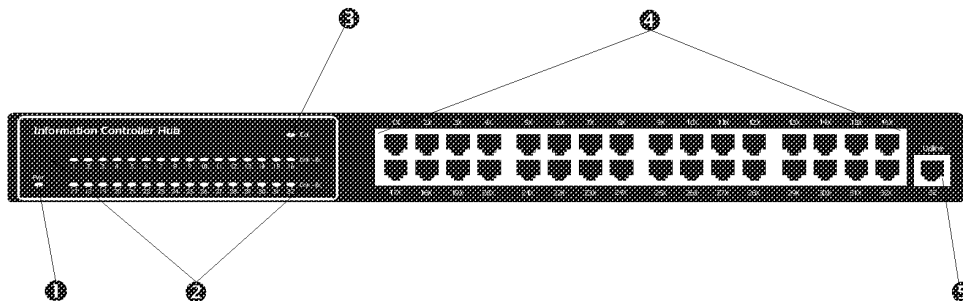
Information Controller and Hub



Controller front panel



❶	COM 2	RS-485 port—reserved for future use.
❷	COM 1	RS-232 port—reserved for future use.
❸	HDD	Hard disk drive LED: • amber—disk is being accessed
❹	Power	Power LED: • green—the controller is powered on
❺	VGA/Monitor	Connector—reserved for future use.
❻	Reset	Switch that reboots the Information Controller. The controller is shipped with a plastic screw inserted into the reset switch.
❼	Kbd	PS/2 Keyboard port—reserved for future use.
❽	APC LAN	Ethernet port for connecting to the private APC network.
❾	User LAN	Ethernet port used to connect to the user's network.
❿	Link-Rx	Link LEDs: • solid amber—link is valid • flashing amber—activity on the port • off—link is invalid
⓫	100	Speed LEDs: • off—operating at 10 Mbps • green—operating at 100 Mbps  Note Because the APC LAN operates at 10Mbps, it is normal for the APC LAN speed LED to be off .

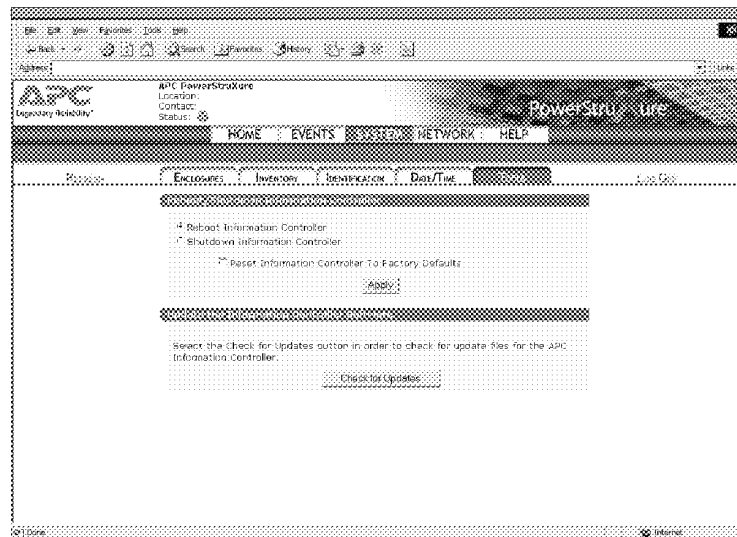
Hub front panel



❶	Pwr	Power LED: • green—the hub is powered on
❷	Link-Rx	LEDs indicate status for each port: • solid green—link is on • flashes green—activity on the port
❸	Col	Collision LED: • flashes amber—collision on network  Note Collisions are normal; unless this LED is on continuously, your APC LAN is operating normally.
❹	10Base-T Ports	Station ports for connecting PowerStruXure equipment to the Information Controller. The “x” in the numbering is short for MDI-X.  Note Only port 32 or 32x can be in use at any time. Do not connect covers to both parts simultaneously.
❺	Uplink Port	10Base-T port for interconnecting hubs.

How to shut down the Information Controller software

You can shutdown the Information Controller through the software interface: at the **System** screen, go to the **Tools** menu and select **Shutdown Information Controller**.



How to access the Information Controller APC LAN

This procedure is for accessing the Information Controller; for information on setting up the APC LAN and the Information Controller on your LAN, see the procedures in “Connect the Information Controller and Hub” on page 79.

1. Connect a computer to one of the ports on the Information Controller Hub, using a 10Base-T network cable. This computer must be configured to *automatically obtain an IP address*.
2. Release and renew your laptop’s IP address:
 - for Windows 95/98 run *winipcfg.exe*
 - for Windows NT/2000, run *ipconfig.exe*



The controller will assign your computer one of its private IP addresses.

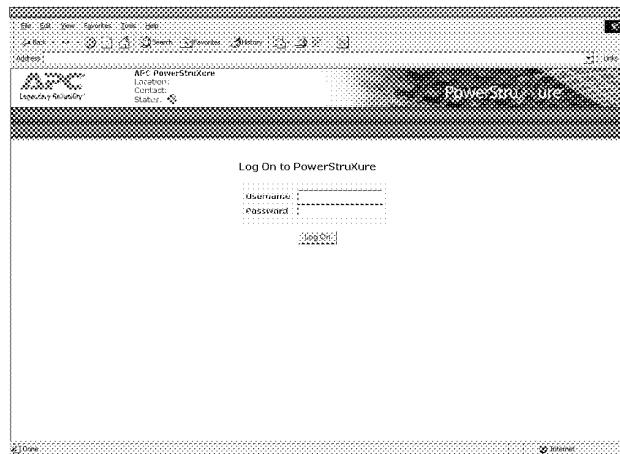
Note

3. Access the Information Controller’s local interface (via APC LAN) by opening your browser and entering the following IP address:
192.168.1.1
4. Log on to the Information Controller, using the APC default username and password (*apc*, lowercase).

How to access the Information Controller on your LAN

This procedure is for accessing the Information Controller from your LAN; for information on setting up the APC LAN and the Information Controller on your LAN, see the procedures in “Connect the Information Controller and Hub” on page 79.

1. From a computer on your public LAN, open a browser and type in the IP address assigned to the Information Controller.
2. Enter the APC default username and password (*apc*, lowercase) on the logon screen.



Customization

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PDU with System Bypass

Important safety instructions

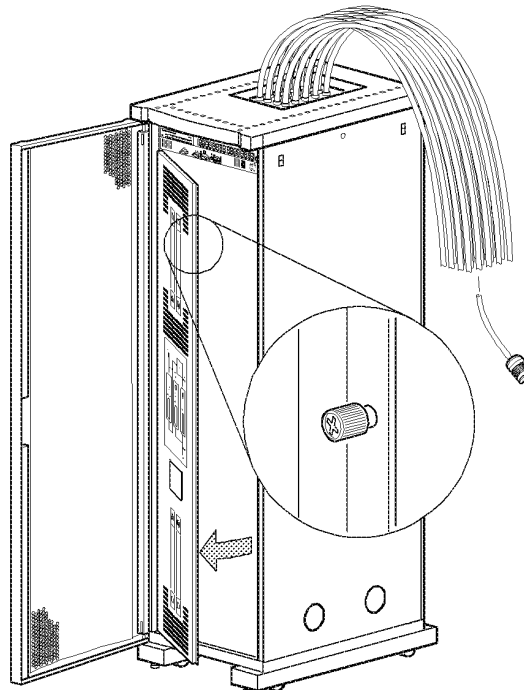


APC does not recommend live maintenance of the PDU with System Bypass. However, APC is aware that due to the critical nature of data center loads, live maintenance may occur. If live maintenance does occur, the following precautions must be observed to reduce the risk of electric shock:

1. Never work alone.
2. Only a certified electrician who is trained in the hazards of live electrical installation can perform the maintenance.
3. Know the procedure for disconnecting electricity to the PDU with System Bypass and the data center in the event of an emergency.
4. Use rubber-insulated gloves and rubber-insulated boots. If rubber-insulated gloves are not available, work with one hand either in your pocket or behind your back to prevent an arm-to-arm electric shock.
5. Double-insulated tools must be used. If double-insulated tools are not available, insulate all tools with electrical tape.
6. Use electrical tape to insulate uninsulated conductive parts.

How to add a breaker on the PDU with System Bypass

1. Unlock and open the front door.
2. Open the panel behind the front door by loosening the two screws on the right side of the panel.



3. Select the next available breaker position(s) in either the upper or lower distribution panel for placement of the new breaker.
4. Snap the new single- or triple-pole breaker into the appropriate plastic guide rail.



Note

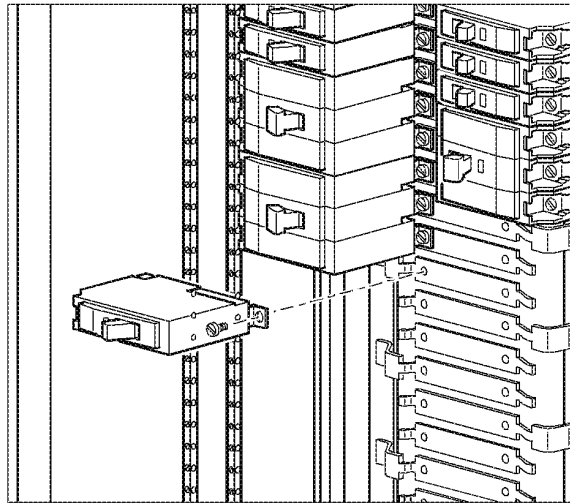
Use only Square D, Type Q0 breakers.

5. Make the individual bolt-on connections between the breaker and the bus.



Note

There is one bolt-on position for a single-pole breaker and three bolt-on positions for a triple-pole breaker.



6. After the breaker has been fully installed (as per Step 6), remove the corresponding plastic blanking plate on the front panel.

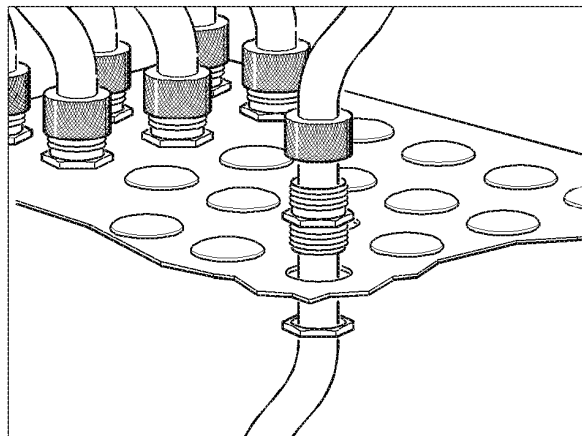
How to add a power cord (whip) to the PDU with System Bypass

Before adding a whip to the PDU, add a breaker.



For instructions, see “How to add a breaker on the PDU with System Bypass” on page 131-1

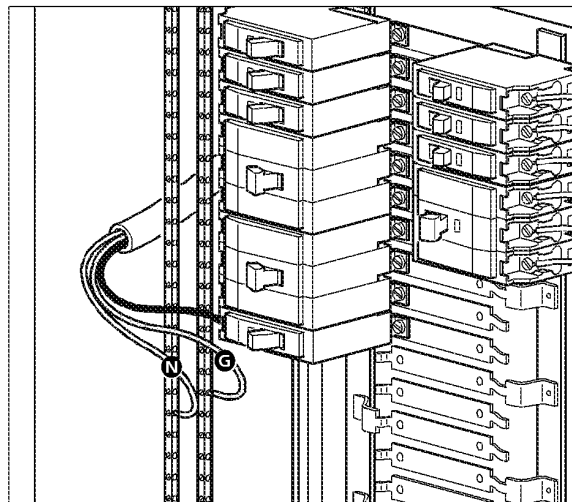
1. Open the top, small door at the rear of the PDU with System Bypass, and perform the following steps to add a whip:
 - a. Install a strain-relief connector in any available knockout on the roof of the PDU with System Bypass.



- b. Slide enough of the whip through the strain-relief connector to reach the new circuit breaker.
 - c. Tighten the strain-relief connector.
2. At the front of the PDU with System Bypass, connect the whip's individual wires.

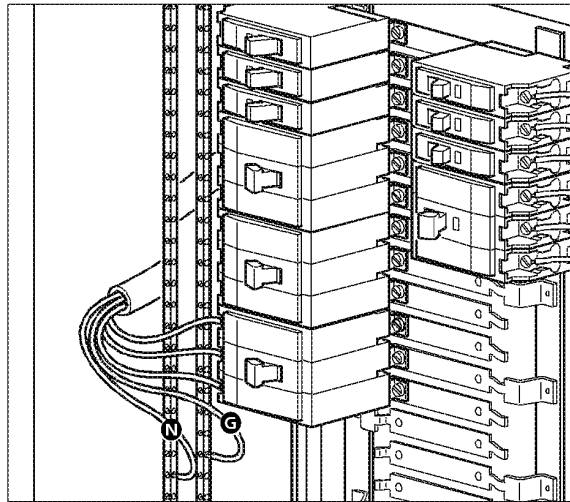
For a single-branch whip:

- a. Connect the BLACK wire to the new CIRCUIT BREAKER's bolt-on position.
- b. Connect the WHITE wire to any open termination point on the NEUTRAL BAR that is closest to the new circuit breaker. There are two neutral bars in the PDU with System Bypass. These are the vertical bars located to the far left and the far right of the distribution panel.
- c. Connect the GREEN wire to any open termination point on the GROUND BAR that is closest to the new circuit breaker. There are two ground bars in the PDU with System Bypass. These are the vertical bars located between the neutral bars.



For a triple-branch whip:

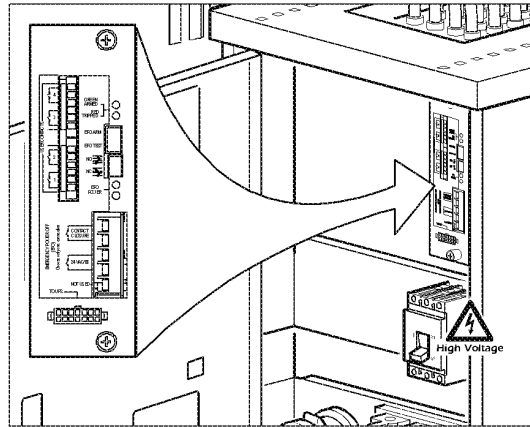
- a. Connect the BLACK, RED and ORANGE wires (in that order, from top to bottom) to each of the new CIRCUIT BREAKER's bolt-on positions.
- b. Connect the WHITE wire to (any open termination point on) the NEUTRAL BAR that is closest to the new circuit breaker. There are two neutral bars in the PDU with System Bypass. These are the vertical bars located to the far left and the far right of the distribution panel.
- c. Connect the GREEN wire to (any open termination point on) the GROUND BAR that is closest to the new circuit breaker. There are two ground bars in the PDU with System Bypass. These are the vertical bars located between the neutral bars.



3. Close and secure the front panel by tightening the two screws on the right side of the panel.
4. Close and lock the front door.

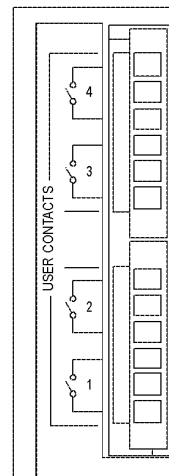
How to connect contacts to the PDU Monitoring Unit

The PDU with System Bypass monitoring unit provides four contact closure connections for monitoring dry contacts. The figure below shows the location of the monitoring unit.



Follow the procedure below to connect and monitor your contacts.

1. Choose the contact number(s). The figure below shows the number and placement of the contact connections on the monitoring unit.



2. Perform these steps from the PDU with System Bypass display interface:
 - a. Press the ESC or ENTER key to go to the Top-Level Menu screen.
 - b. Select **Contacts** on the Top-Level Menu screen and press ENTER.
 - c. Press the ENTER key to select the contact number you are connecting.



Note

The continue arrow ⇅ will appear before the contact number.

- d. Press the UP or DOWN arrow key to select the appropriate contact number and press ENTER.
- e. Press the DOWN arrow key to enter a unique **Name** for the contact and to configure the **Normal** state of the contact (Open or Closed). The default **Normal** state is Open. Press ENTER to select the item you wish to configure.



Note

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

3. Connect contact wires (300 V-rated cabling required) to the terminal block on the monitoring unit.



Note

The connection for contacts is a pluggable screw terminal block. The block can be removed while connecting wires. You will need a 2.5 mm standard screw driver.

4. Run the wires from the terminal block on the monitoring unit out the roof of the PDU with System Bypass to your contact's location.



Warning

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

NetShelter VX Enclosures

How to remove the leveling feet and casters

1. Gently place the enclosure on its side. This should be done with all equipment removed from the enclosure.



Heavy

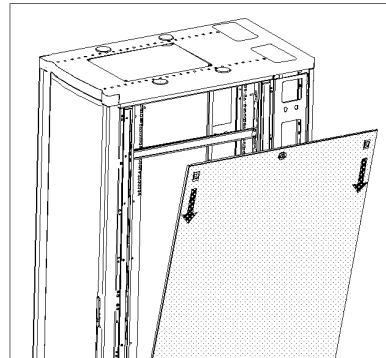
To avoid personal injury or damage to the enclosure, two people should support the enclosure.

2. Remove the four hex nuts from each caster, using a 10-millimeter wrench, and remove the casters.
3. Fit the 14-millimeter end of the open-ended wrench (included) to the hex nut just above the round pad on the bottom of the leveling foot. Turn the wrench clockwise to extend the leveling foot until it comes off.
4. Repeat Step 3 for each of the remaining leveling feet.

How to remove and install the side panels

You can remove the side panels for access to the interior. To remove the side panels:

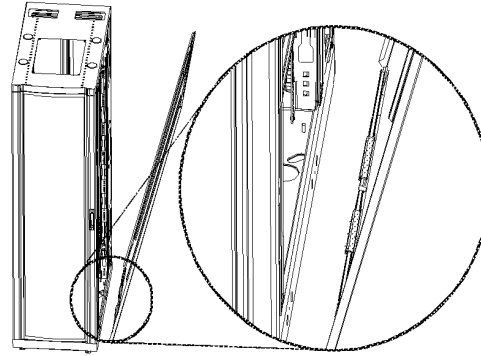
1. Use the key to unlock the panel, if necessary.
2. Slide both panel latches down at the same time and pull the top of the panel toward you.



Heavy

To avoid personal injury, two people should lift the panel.

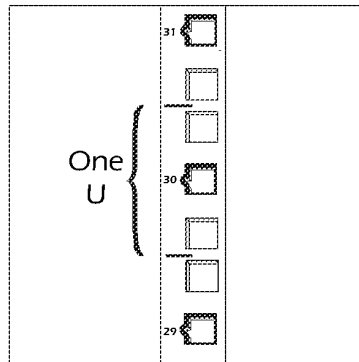
3. Release the latches and lift the panel up and off the narrow horizontal lip at the bottom of the enclosure frame.



To reinstall: Engage the bottom of the panel securely with the rail before pushing the top of the panel forward into place.

How to identify one U-space on the mounting rail

When installing equipment, you will need to locate the top and bottom of a U-space on the mounting rails. Every third mounting hole on the mounting rails of a NetShelter VX enclosure is notched and numbered to indicate the middle of a U-space. A U-space takes up one of these notched holes and one hole immediately above and below it, as shown.



Caged nuts

During installation of equipment in your enclosure, you may need to install or remove caged nuts. Follow the procedures in this section when installing or removing caged nuts from the enclosure.



Warning

Install caged nuts horizontally, with the ears engaging the sides of the mounting hole. Do NOT install caged nuts vertically with the ears engaging the top and bottom of the mounting hole.

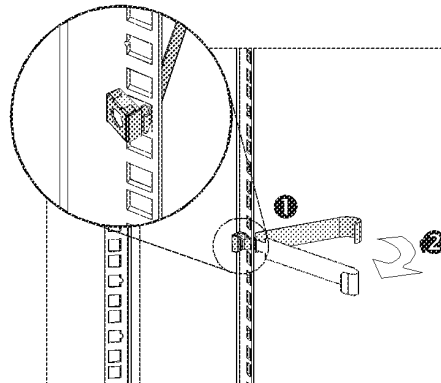
How to install and remove caged nuts



Note

Install the caged nuts on the side of the mounting rail that is opposite the equipment to be mounted.

1. Insert the caged nut into the mounting hole by hooking one ear of the caged nut assembly through the far side of the hole.
2. Place the caged nut tool (included) on the other ear of the caged nut and pull to snap it into position.

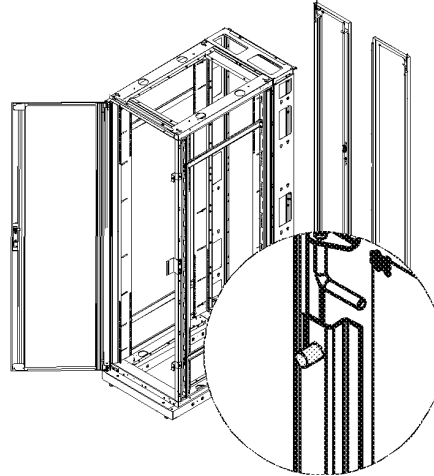


3. Detach the tool from the caged nut.

To remove: Remove any attached screws and reverse the action in Step 2. Grasp the caged nut before releasing the tool.

Grounding studs

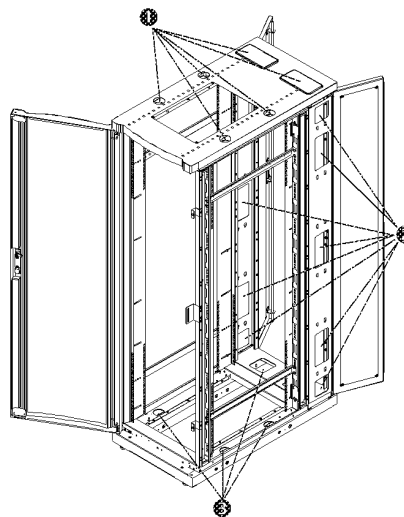
The enclosure has thirteen grounding studs, which are located on the doors, the roof, the side panels and the frame. American Power Conversion offers an optional grounding kit (AR8390) for grounding the enclosure.



Ground Studs	
Qty	Location
4	Base
1	Rear cabling channel
1	Roof
2	Front door
4	Rear doors
1	Side panels (base model only)

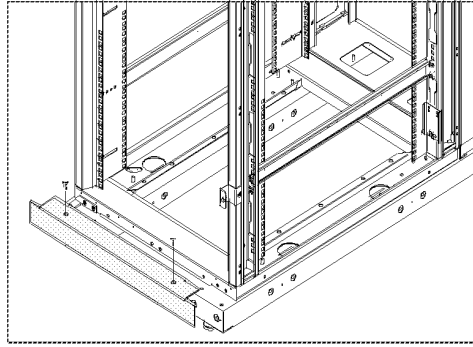
Location of cable access holes

There are cable access holes in the roof ❶, sides ❷, and base ❸ of the enclosure. The rear cabling channel on the back of the enclosure has ample clearance between the doors and the mounting rails for cable routing.



Skirt removal

The skirt at the front of the enclosure can be detached for additional cable access by removing the screws.



Cable management devices

Optional cable management devices can be used for helping to route and dress cables:

- Cable Management Hoops (AR8113)
- Cable Containment Kit (AR8116BLK)
- Rear Cable Management Tray (AR8118BLK)
- Side Cable Management Tray (AR8114BLK)

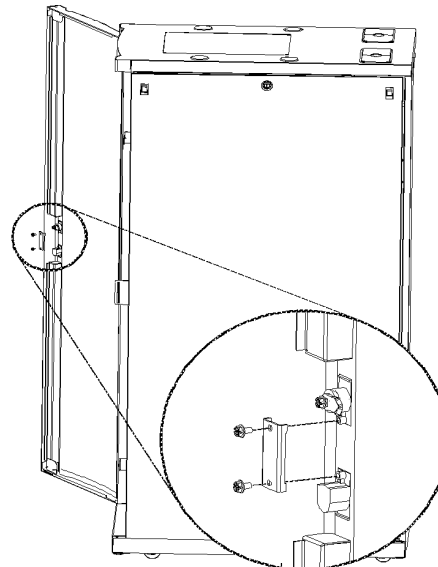
How to reverse the door

You can reverse or remove the front door to accommodate your site configuration. This section shows how to remove and reverse the door on your enclosure.

1. Remove both side panels. (See “How to remove and install the side panels” on page 131.)

Reverse the door handle.

2. Remove the two Phillips screws from the rear of the door handle assembly and remove the handle assembly from the door.

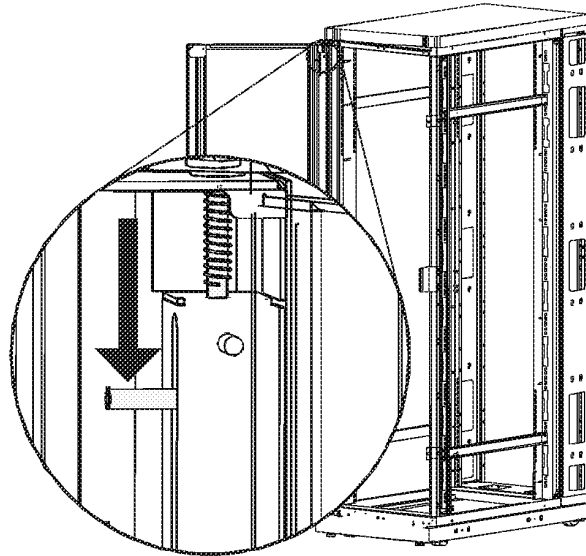


3. Rotate the door handle assembly 180° and reinstall it using the hardware removed in Step 2.
4. Continue with “Remove the door” on page 136.

Remove the door.



To avoid personal injury or damage to the enclosure, one person should support the door while another releases the door from its frame.

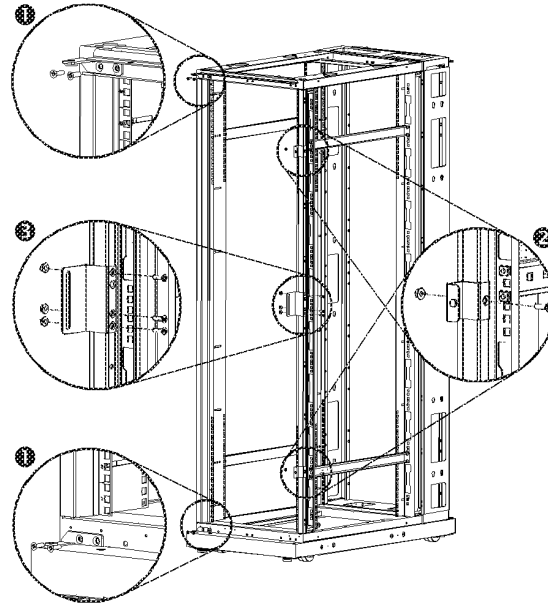


5. Open the door and pull down on the spring-loaded hinge pin attached to the top of the door. Lift the door from its frame and set safely aside.

Remove the hinge pin brackets, bumpers, and latch plates.

Remember the location and distance between all items being removed. You will need to duplicate this positioning when reinstalling.

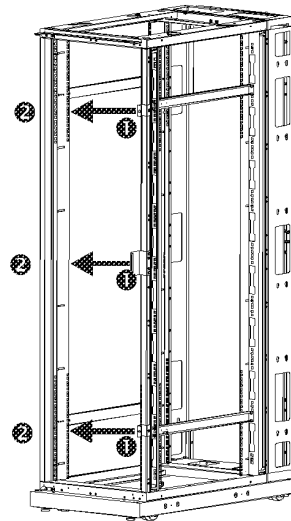
6. Use a Phillips head screwdriver to remove the hinge pin brackets, bumpers, and latch plate from the enclosure frame.



On the expansion enclosure, the bumpers and latch plate screws also attach the finishing trim. Replace the trim using the socket-head screws. Replace the bumpers and latch plate using the counter-sunk screws from the hardware bag.

Reinstall the hinge pin brackets.

7. Reinstall the hinge pin brackets on the opposite side of the enclosure:
 - a. Remove the small plastic plugs covering the insertion holes in the plinths and the top of the enclosure frame.
 - b. Reinstall the two hinge pin brackets from their original position ❶ to their new position ❷.



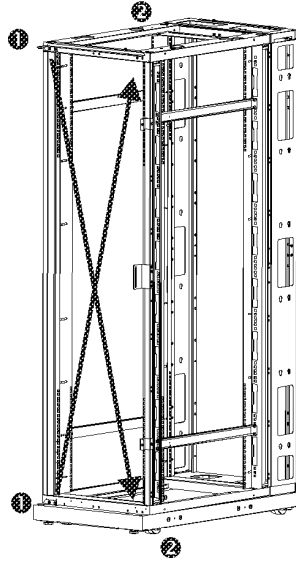
- c. Secure the hinge pin brackets by threading the hex nuts onto the screws. Hand-tighten the screws; they will be tightened firmly later in the procedure.

Reinstall the latch plate and bumpers.

8. Reinstall the latch plate and the two door bumpers from their original position ❶ to their new position ❷.



Be sure to maintain the original spacing between the latch plate and bumpers, as well as their vertical relationship with the enclosure frame.



If you are using an expansion enclosure, use the socket-head screws in the hardware bag to reinstall the latch plate and bumpers.

9. Reinstall the small plastic plugs in the frame and the plinths in the empty holes that once held the hinge pin brackets and hinge pins before the door was reversed.

Reinstall the door assembly.

10. Reinstall the door assembly.



To avoid personal injury or damage to the enclosure, one person should support the door while another secures the door to its frame.

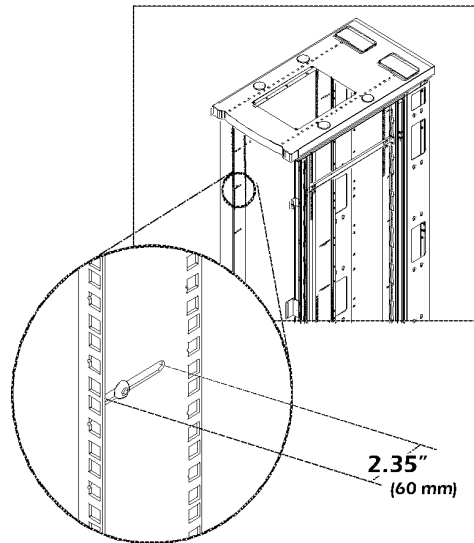
- a. Reverse the steps for removing the door. (See “Remove the door” on page 136.)
 - b. Make sure that the door opens and closes properly and then firmly tighten the countersunk screws to secure the hinge pin brackets to the enclosure frame.
11. Reinstall the side panels for AR2100 series. (See “How to remove and install the side panels” on page 131.)

Mounting rails

The vertical mounting rails are factory-installed in the proper position for use with Compaq® rack-mountable equipment that has a depth of 29.13 inches (739 mm). You can adjust the rails to the front or rear a total of 2.35 inches (60 mm) to accommodate different rails or equipment with various depths. You can also move the rails by attaching them to the horizontal braces. The following sections describe the procedures for adjusting the position of the mounting rails and for moving them within the enclosure.

Location of screws for adjusting the mounting rail

The location of the screws that govern the position of the mounting rails is shown below.



How to adjust the mounting rails on the frame posts

1. Use the 5-millimeter Allen wrench (included) to loosen (but not remove) the socket-head screws in the slot of the mounting rail.
2. Slide the mounting rail forward or rearward as desired, staying parallel with the frame posts. Tighten each screw.

How to move the rails to a new position using the side braces

1. Remove the side panels from the enclosure. (See “How to remove and install the side panels” on page 131.)
2. Use the 5-millimeter Allen wrench (included) to remove the socket-head screws in the slots of the mounting rail.
3. Locate the new position for the mounting rail.
4. Secure the vertical mounting rail to each horizontal brace:



Note

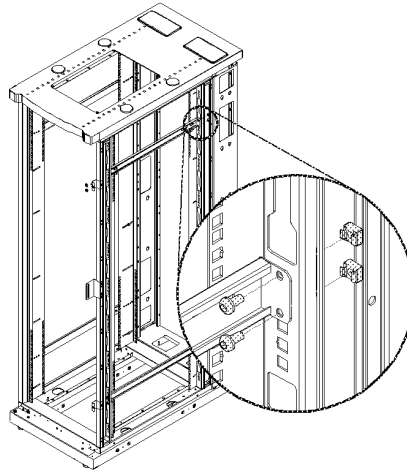
You may have to adjust the position of the brace up or down to align it with the mounting channel in the rear mounting rail. (See “How to move a brace” on page 140.)

- a. Insert a caged nut into the appropriate holes at the new position on the upper and lower horizontal brace.
- b. Place the mounting rail at the new position and insert a socket-head screw through the rail, brace, and caged nut.
- c. Tighten the screw to secure the mounting rail to the brace.

How to move a brace

Each side of the enclosure has two horizontal braces between the vertical frame posts. These adjustable braces provide structural support and are available for managing cables or to support the mounting rails.

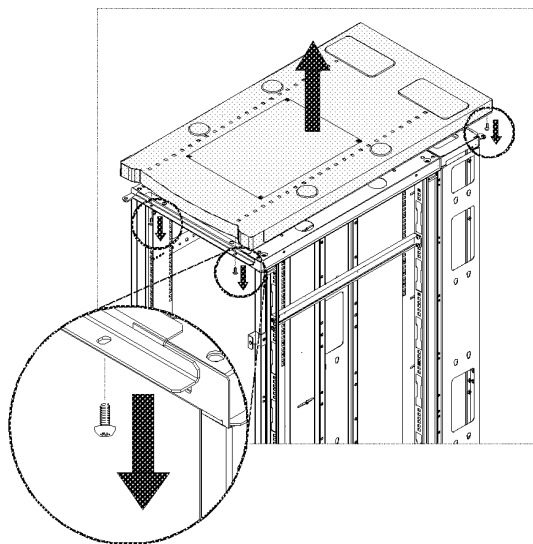
1. Use the 5mm Allen wrench (included) to remove the four socket-head screws that are holding the brace to the frame posts.



2. Remove the caged nuts from the frame post. (See “How to install and remove caged nuts” on page 133.)
3. Locate the new position for the brace and secure the brace to the frame posts:
 - a. Insert a caged nut into the appropriate holes at the new position on the frame post.
 - b. Place the brace at the new position and insert a socket-head screw through the brace, frame post, and caged nut.
 - c. Tighten the screw to secure the brace to the frame post.

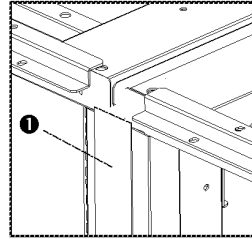
How to remove the roof

Remove the roof from the enclosure by removing the four socket-head screws from the inside corners. Use the 5-millimeter Allen wrench (included).

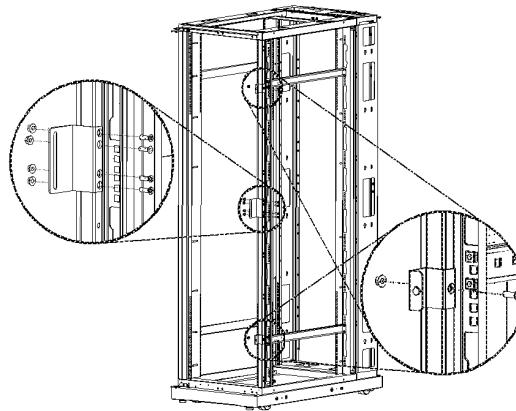


How to move the vertical baying trim

The vertical baying trim is pre-installed to one side of the expansion enclosure. The vertical baying trim ❶ covers the gap between enclosures after they have been joined together. Your site configuration may require you to move the trim to the other side of the enclosure.



1. Using the 5-millimeter Allen wrench (included), remove the four socket-head screws securing the vertical trim, the door latch, and the door bumpers to the frame of the enclosure.



2. Replace the door latch and bumpers using the countersunk socket-head screws from the hardware bag.
3. Reinstall the trim to the opposite side of the enclosure.
 - a. Insert the capped socket-head screw, removed from the other side of the enclosure, through the upper hole in the vertical trim and the original hole in the frame of the enclosure.
 - b. Repeat the step above for the lower hole in the vertical trim.
 - c. Tighten the screws securing the vertical trim to the enclosure assembly.
4. Reinstall any side panels required. (See “How to remove and install the side panels” on page 131.)
5. Reinstall the roof of the enclosure. Replace the four socket-head screws with the 5-millimeter Allen wrench (included).

Metered Rack-Mount PDU

Hardwiring procedure (optional)

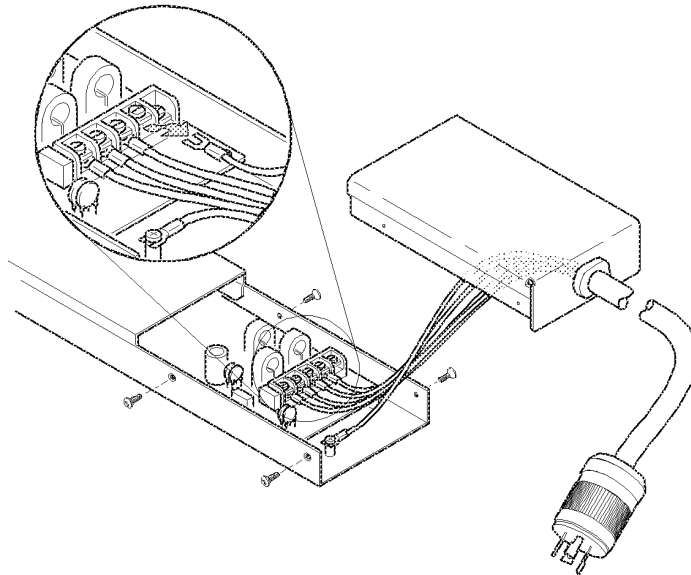
Remove the power Cord.



Note

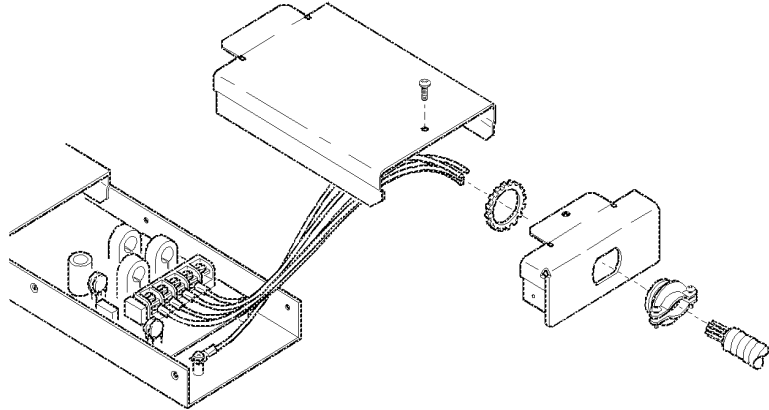
Make sure that power to the Metered Rack-Mount PDU has been turned off and unplug any attached equipment to prevent damage if a mistake occurs during wiring.

1. Detach the inspection cover on the power inlet end of the Metered Rack-Mount PDU by removing the four screws on the sides of the cover and tilt the cover upward so that the terminal block is exposed. Set the screws aside for later use.
2. Loosen the four screws that hold the power cord's wires to the terminal block, and loosen the screw that holds the ground wire to the standoff on the metal chassis.
3. Pull the power cord and the inspection cover from the Metered Rack-Mount PDU.

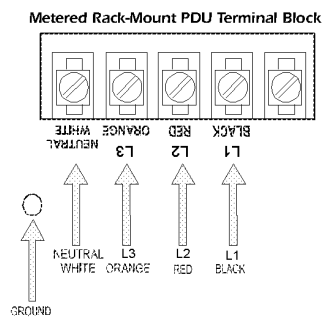


Attach wiring to terminal block.

4. Attach a 1-inch conduit termination to the hardwiring end cap (p/n 870-70803).
5. Attach the hardwiring end cap assembly to the power inlet end of the Metered Rack-Mount PDU, using two of the screws removed in step 1.



6. Attach wires to the terminal block as labeled on the board. Tighten the terminal block screws to secure the wires.



7. Attach a ground wire to the standoff on the metal chassis and tighten the screw to secure the ground to the chassis.
8. Place the hardwiring access cover (p/n 870-70804) on the strip and secure with one screw in the hole on the top of the cover.
9. Apply power to the strip, observing the status LED on the display interface. If the unit is connected properly, the LED will illuminate.

Specifications

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PDU with System Bypass

Operating specifications

Power Distribution Unit	
Operating Environment	Protected from water and conductive contaminates
Temperature Class	Class H (220° C)
Storage Elevation (for aircraft transportation)	10 000 m
Relative Humidity (for operating and storage)	95% non-condensing
Operating Temperature	0 – 40° C (32 – 104° F)
Acoustic Noise Emission	Maximum 50dB(A) at 1 m

Electrical specifications

	208V	480V	600V
Service Distribution Breaker (provided by customer)	200 amp	100 A	80 amp
Conductors to Main Input Breaker (provided by customer)	3/0 conductors	#3 conductors	#4 conductors
Transformer Type	Isolation	Step-Down	Step-Down
Transformer Configuration	Delta to WYE	Delta to WYE	Delta to WYE
Nominal Voltage Requirements	208V: 208/120V	480V: 208/120V	600V: 208/120V
Frequency	57 – 63 Hz	57 – 63 Hz	57 – 63 Hz
Input Voltage AC	3-phase 3-wire plus ground, 208V	3-phase 3-wire plus ground, 480V	3-phase 3-wire plus ground, 600V
Output Voltage AC	3-phase 4-wire plus ground, 208V	3-phase 4-wire plus ground, 208V	3-phase 4-wire plus ground, 208V
Full Load Output Rating	40 KW	40 KW	40 KW
Maximum Continuous Input Current (at minimum mains)	155 amps	67 amps	54 amps
Maximum Continuous Output Current + 125% Overload (Bypass Mode only)	139 amps	139 amps	139 amps
Nominal Output Current	111 amps	111 amps	111 amps
Nominal Input Current	125 amps	54 amps	43 amps
Internal Static Switch Fuses	175 amps	175 amps	175 amps
External Output Breaker	150 amps	150 amps	150 amps

Symmetra 3-Phase UPS

Symmetra 3-Phase UPS Specifications	
Input Specifications	
AC Input Voltage	The UPS will operate from mains at full load over the following ranges: 166 - 240 VAC line-to-line (for North America); 304 - 477 VAC line-to-line (for Europe) and 160 - 230 VAC line-to-line for Japan (including transformer). If the AC input voltage exceeds this range, the UPS will operate from battery power. The UPS may operate on-line below this range if the load is reduced from full power, thus extending the life of the batteries. When operating on battery power, the UPS will not retransfer to AC power until the line has returned to an acceptable level plus a hysteresis margin (based on loading on the UPS).
DC Input Voltage	The battery voltage produced by the battery system is +/- 192 VDC nominal
Input Frequency Range	40-70 Hz.
Input Power Factor	>0.99 at full load and operating on-line at nominal input voltage.
Input Inrush Current	< normal input current without transformer*
Input Generator Sizing	Generator kW rating $\geq 1.25 \times$ UPS kW rating Generator kVA rating $\geq 1.40 \times$ UPS kVA rating
Output Specifications	
Output Voltage	3x208VAC for North America and Japan 3x380/400/415 VAC for Europe
Output Power	see electrical installation
Load Power Factor	0.5 - 1.0
Output Frequency	Synchronized to mains: programmable frequency range ± 3 Hz or ± 0.1 Hz. around nominal frequency (50 or 60 Hz).
Output Voltage Regulation Steady State	+ 1%
Output Voltage Regulation Transient/ Dynamic	$\pm 5\%$
Recovery Time	< 5 mS
Total Harmonic Distortion	<2% when loaded to 100% of rated capacity in Watts <5% with a computer load under all rated environmental conditions
Output Specifications	
Crest Factor	2.7
Overload Capacity	Sustainable Overload 2: $\leq 150\%$ for 30 seconds

Symmetra 3-Phase UPS Specifications	
Efficiency, Fully Charged	>91.5% for North America
Physical Specifications	
Audible Noise - at 70% Load	<58 dBA
Dimensions	Width: 23.5" Depth: 34.3" Height: 81.4" (597 x 871 x 2058 mm) for Europe and North America Width: 47" Depth: 34.3" Height: 2068" (1194x871x2058) for Japan
Weight - Fully Loaded	1395 lbs (633 kg) for Europe and North America 2055 lbs (932 kg) for Japan (Isolation Transformer included)
Heat Dissipation - Fully Loaded	12,682 BTU/hr (North America)
Compliance Specifications	
UL Listed	UL 1778
CE Verified Class A	Standards EN50091-2 (Uninterruptible Power Systems, Part 2: EMC Requirements), EN 55022 (Limits and method of measurement of radio disturbance characteristics of information technology equipment) and EN 50082-1 (Electromagnetic Compatibility - General Immunity Standard Part 1: Residential, Commercial and Light Industry).

* \leq 10 x normal input current with isolation transformer (optional equipment).

3-Phase Automatic Transfer Switch

Item	Specification
Nominal input voltage	100/173–120/208 V
Acceptable input voltage	90/156–140/242 V
Nominal input frequency	50/60 Hz
Input connectors	Two 36-inch, attached L21-20P line cords
Output connectors	One 36-inch, attached L21-20R line cord
Maximum total current draw	16 A per phase
Size (h × w × d)	1.71 × 17.00 × 12.00 in (4.34 × 43.18 × 30.48 cm)
Weight:	15.00 lb (6.8 kg)
Shipping Weight	20.5 lb (9.30 kg)
Elevation (above MSL): Operating	0 to 10,000 ft (0 to 3000 m)
Elevation: Storage	0 to 50,000 ft (0 to 15,000 m)
Temperature: Operating	32–104° F (0–40° C)
Temperature: Storage:	32–113° F (0–45° C)
Operating Humidity	0–95%, non-condensing
EMC Verification	FCC Class A, DoC Class A, VCCI
Safety Verification	UL, cUL (UL 60950)

Metered Rack-Mount PDU

AP7601/AP7602

Electrical Specifications	
Input	100–120/173–208 V, 3 ϕ 16 A 7601: NEMA L21-20 plug 7602: NEMA L21-20 plug
Output	7601: 100–120 V, 3 \times 16 A 42, NEMA 5-20 R receptacles 7602: 100–120/173–208 V, 3 \times 16A 21, NEMA 5-20R; 6, NEMA L6-20R receptacles
Physical Specifications	
Dimensions	1.75 \times 3.5 \times 60 in (4.5 \times 8.9 \times 152.4 cm)
Weight	17 lb (7.7 kg)
Shipping dimensions	4 \times 5 \times 72 in (10.2 \times 12.7 \times 182.9 cm)
Shipping weight	19 lb (8.6 kg)
Operating temperature	23–113° F (-5– 45° C)
Operating humidity	5–95% RH non-condensing
Operating elevation	10,000 ft (3000 m) above MSL
Storage temperature	-13–149° F (-25–65° C)
Storage humidity	5–95% RH non-condensing
Compliance Specifications	
Approvals	UL, CUL, FCC, VCCI

Information Controller and Hub

Information Controller specifications

Electrical Specifications	
Input	100–240 VAC; 50/60 Hz; 0.5 A
Physical Specifications	
Dimensions	1.7 × 17 × 6.5 in (4.3 × 43.2 × 16.5 cm)
Weight	6.2 lb (2.8 kg)
Shipping dimensions	2.75 × 18.75 × 13.5 in (7.0 × 47.7 × 34.3 cm)
Shipping weight	8.0 lb (3.65 kg)
Operating temperature	23–113°F (-5–45°C)
Operating humidity	5–95% RH non-condensing
Operating elevation	10,000 ft (3000 m) above MSL
Storage temperature	-13–49°F (-25–65°C)
Storage humidity	5–95% RH non-condensing
Compliance Specifications	
Approvals	UL, cUL, VDE, FCC Class A, AS/NZS 3548, VCCI Class A, EN 55024, EN61000-3-2, EN61000-3-3, CE

Information Controller Hub specifications

Electrical Specifications	
Input	100–240 VAC; 50/60 Hz; 0.5 A
Physical Specifications	
Dimensions	1.7 × 17.0 × 7.0 in (4.3 × 43.2 × 17.8 cm)
Weight	4.8 lb (2.2 kg)
Shipping dimensions	3.25 × 19.25 × 10.5 in (8.3 × 48.9 × 26.7 cm)
Shipping weight	6.5 lb (3.0 kg)
Operating temperature	23–113°F (-5– 45°C)
Operating humidity	5–95% RH non-condensing
Operating elevation	10,000 ft (3000 m) above MSL
Storage temperature	-13–149°F (-25–65°C)
Storage humidity	5–95% RH non-condensing
Compliance Specifications	
Approvals	UL, cUL, VDE, FCC Class A, VCCI Class A, EN55022, EN 50082-1, AS/NZS 3548

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Symmetra 3-Phase UPS

Handling and transport

Follow these guidelines if you need to ship the Symmetra 3-Phase UPS to another location.



Always **REMOVE BATTERIES** before shipping the Symmetra 3-Phase UPS to avoid damage during transport. (U.S. Federal Regulation requires that batteries be disconnected during shipment.)

The above requirement applies anytime the Symmetra 3-Phase UPS is moved—either indoors or outdoors, by itself or as part of a PowerStruXure installation.

Remember to reinstall the battery and power modules after the Symmetra 3-Phase UPS has arrived at its destination.

Module replacement

Battery units, power modules, and intelligence modules can be replaced by the user. If a power or a main intelligence module fails and a “redundant” module is present, the failed module can be replaced without interrupting power to the load equipment.

If a functioning intelligence module is already installed, you can replace a redundant intelligence module without interrupting the power to the load.



Note

If the Symmetra 3-Phase UPS is not in the on-battery operating mode, you can replace a battery module without interrupting power to the load.

How to obtain replacement modules

To obtain a replacement module, contact APC Customer Support (see page 168). Prepare to provide the additional information:

- In the event of a module failure, the display interface may display additional “fault list” screens. Press any key to scroll through these fault lists, record the information, and relay it to the APC Customer Support technician.
- If possible, call APC Customer Support from a telephone that is within reach of the Symmetra 3-Phase UPS display interface. This will help to gather and report additional information to the APC Customer Support technician.
- Be prepared to provide a detailed description of the problem. A Customer Support technician will help you solve the problem over the telephone, if possible, or will give you a return material authorization (RMA) number. If a module is returned to APC, this RMA number must be clearly printed on the outside of the package.
- If the Symmetra 3-Phase UPS is within the warranty period, repairs will be performed free of charge. (See “Warranty” on page 165.) If it is not within the warranty period, there will be a charge for repair.
- If the Symmetra 3-Phase UPS is covered by an APC PowerPlanSM service product, have that information available and give it to the APC Customer Support technician.

How to replace a power module

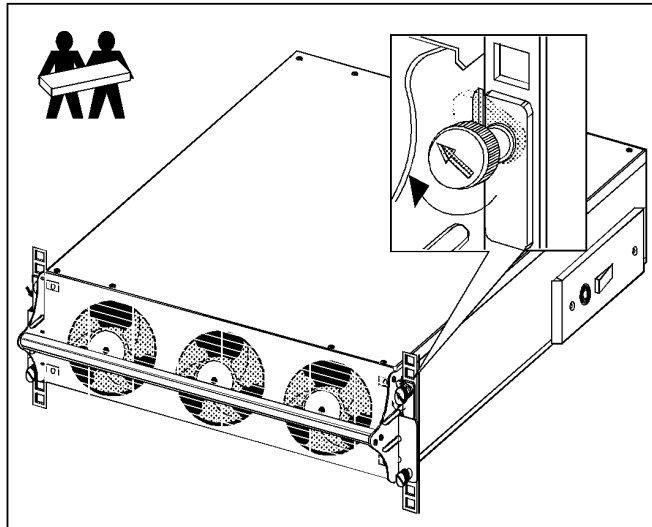


Only qualified, APC trained personnel should replace power modules.

The display interface indicates the location of the faulty power module (rows 1 through 5).

To remove the faulty power module:

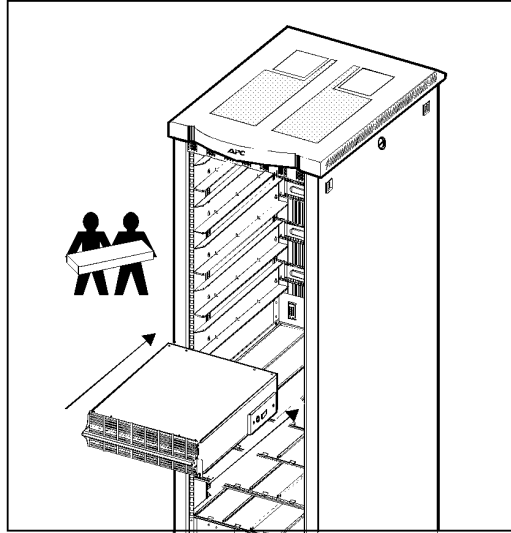
1. To deactivate the power module, turn the knob (with arrow pointing toward the module) counterclockwise until it points downward.



2. Turn the spring-activated finger screws (one at either side of the module) until they pop out.
3. Standing on either side of the Symmetra 3-Phase UPS enclosure, two people should pull the power module outward until it is fully extended in the locked position.
4. With the power module resting in the UPS enclosure, release the lock by depressing the catch on each side of the power module.
5. Pull the power module away from the UPS enclosure.

To install the new power module:

1. With one person on each side of the power module, push the power module all the way into the Symmetra 3-Phase UPS enclosure. (The power module is self-guiding.)



2. Turn the finger screws clockwise to fasten.
3. Turn the knob clockwise until the arrow points toward the power module to re-activate the power module.
4. Verify that the Symmetra 3-Phase UPS display interface shows a message saying that it has registered the installation.



Note

If your Symmetra 3-Phase UPS includes a “redundant” power module, the failed module can be replaced without interrupting power to the connected equipment.

How to replace a battery unit



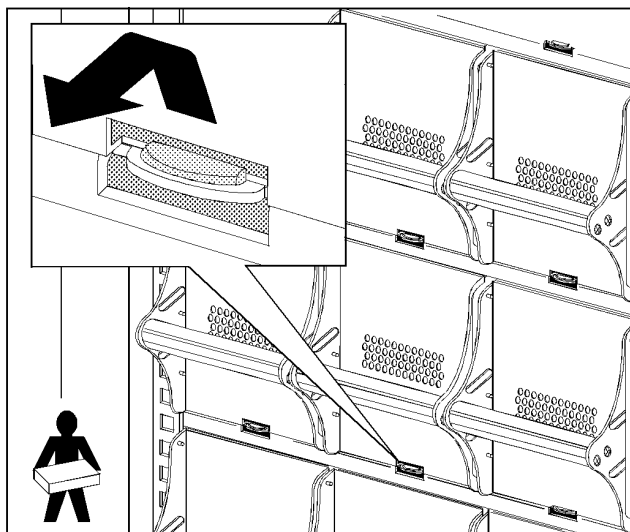
Warning

Only qualified, APC-trained personnel should replace battery units.

The Symmetra 3-Phase UPS display interface will indicate the location of the faulty battery unit (rows 1 through 4).

To remove the faulty battery unit:

1. Holding the handle, gently lift the battery handle and then pull it outward until it is fully extended in the locked position.



2. To release it from the lock mechanism, gently push the battery upward again and pull outward, supporting the battery unit with your free hand.

To install a new battery unit:

1. Position the battery to slide in between the two grooves in the empty slot in the enclosure and push the unit all the way into the Symmetra 3-Phase UPS enclosure.
2. Check that the Symmetra 3-Phase UPS display interface shows a message saying that it has registered the installation.



Warning

Install battery units into the enclosure only when you are ready to apply power to the Symmetra 3-Phase UPS. Failure to do so can result in a deep discharge of the batteries, which may cause permanent damage.

Store the battery module(s) in a cool ambient temperature below 77° F (25° C).



Note

Verify that the Symmetra 3-Phase UPS is operating in on-line mode before replacing a battery module. If the unit is operating in the on-battery mode, power to the connected equipment may be interrupted while the battery is being replaced.

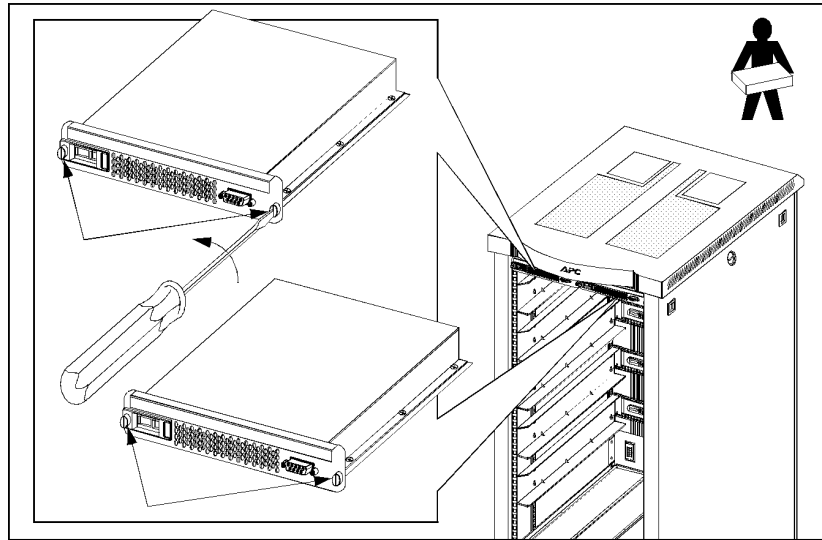
How to replace an intelligence module



A redundant intelligence module can be replaced without interrupting power to the connected equipment, provided that another functioning intelligence module is already installed.

To remove the faulty intelligence module:

1. Loosen the two Phillips screws at either side at the top of intelligence module. Push the small tab in the left side of the module downward to deactivate the intelligence module.



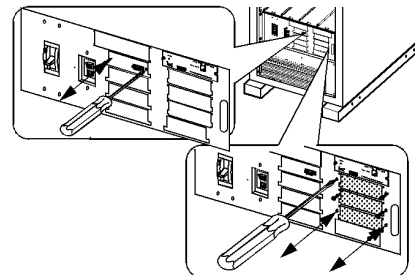
2. Carefully remove the intelligence module from the enclosure by pulling outward on the handle.

To install the new intelligence module:

1. Carefully position the intelligence module between the grooves in the empty slot at the top of the Symmetra 3-Phase UPS enclosure and slide the module inward.
2. Tighten the two Phillips screws to secure the intelligence module to the enclosure.
3. Push the small tab upward to re-activate the intelligence module.
4. Verify that the Symmetra 3-Phase UPS display interface shows a message reporting that it has registered the installation.

How to replace cards

1. Loosen the two Phillips screws at both sides of card.
2. Carefully pull the card outward.
3. Verify that the UPS display interface shows a message reporting that it has registered the installation.



Reverse the above procedures to install a new card.

Replacement parts

Replacement Parts and Numbers	
10kW Power Module	SYPM10KF
40kW Symmetra 3-Phase UPS Only	SYCF40KF
Battery Module	SYBT4
Battery Monitoring Card	SYCBTMON
Battery Unit	SYBTU1
Display and Computer Interface Card	SYCDCI
Intelligence Module	SYMIM4
Network Management Card	AP9616
Switch Gear Monitoring Card	SYCSGMON
Symmetra 3-Phase UPS Static Switch Module	SYSSW40KF
System ID Card	SYCSYSID
System Power Supply Card	SYCSPS
XR Communication Card	SYCXRCOM
XR Frame only	SYCFXR8

How to return modules to APC

Call APC Customer Support (see “APC Worldwide Customer Support” on page 168) to obtain an RMA number. To return a failed module to APC, pack the module in the original shipping materials, and return it by insured, prepaid carrier. The APC Customer Support technician will provide the address. If you no longer have the original shipping materials, ask the technician about obtaining a new set. It is very important that you pack the module properly to avoid damage in transit. Never use styrofoam beads or other loose packaging materials when shipping a module. The module may settle in transit and become damaged. Enclose a letter in the package with your name, RMA number, address, a copy of the sales receipt, description of the problem, a phone number, and a check (if necessary).



Note

Damages sustained in transit are not covered under warranty.

Metered Rack-Mount PDU

How to download firmware revisions to the Metered Rack-Mount PDU



Note

During firmware downloads, power will not be interrupted to the Metered Rack-Mount PDU outlets.

1. Go to the APC Web site and download the latest firmware version for the Metered Rack-Mount PDU.
2. Access the Metered Rack-Mount PDU internal menus: follow the instructions in “How to configure through a serial port connection” on page 89.
3. Log on to the Metered Rack-Mount PDU as an Administrator.
4. From the Main menu, type 6 and press ENTER to choose the **System Management** item.
5. From the System Management menu, type 3 and press ENTER to choose the **Firmware Download** item. From the Firmware Download menu:
 - a. Type 1 and press ENTER to initiate a download. The internal menu will display C repeatedly and the digital display dL.
 - b. Select the **Transfer** pull-down menu from the menu bar.
 - c. Select **Send File** from the Transfer pull-down menu.
 - d. In the Send File window, browse for and select the firmware file you copied to your hard drive.
 - e. In the Send File window, set the protocol to **Xmodem** and press the **Send** button.

When the firmware download is complete, the digital display will refresh and display the current reading again.

Product Information

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Warranty

Limited Warranty

American Power Conversion (APC) warrants its products to be free from defects in materials and workmanship for a period of two years from the date of purchase, except in India where the period is one year for battery modules. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. To obtain service under warranty you must obtain a returned material authorization (RMA) number from APC Customer Support (See “How to Obtain Service” on page 167.) Products must be returned with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and proof of date and place of purchase. This warranty does not apply to equipment which has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser who must have properly registered the product within 10 days of purchase.

EXCEPT AS PROVIDED HEREIN, AMERICAN POWER CONVERSION MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

EXCEPT AS PROVIDED ABOVE, IN NO EVENT WILL APC BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF THIS PRODUCT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Specifically, APC is not liable for any costs, such as lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, costs of substitutes, claims by third parties, or otherwise. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Life-Support Policy

General policy

American Power Conversion (APC) does not recommend the use of any of its products in the following situations:

- In life-support applications where failure or malfunction of the APC product can be reasonably expected to cause failure of the life-support device or to affect significantly its safety or effectiveness.
- In direct patient care.

APC will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to APC that (a) the risks of injury or damage have been minimized, (b) the customer assumes all such risks, and (c) the liability of American Power Conversion is adequately protected under the circumstances.

Examples of life-support devices

The term *life-support device* includes but is not limited to neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators (for adults and infants), anesthesia ventilators, infusion pumps, and any other devices designated as “critical” by the U.S. FDA.

Hospital-grade wiring devices and leakage current protection may be ordered as options on many APC UPS systems. APC does not claim that units with this modifications are certified or listed as hospital-grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

How to Obtain Service

If problems persist

If the equipment requires service do not return it to the dealer! Follow the steps below:

1. Review the appropriate sections of this manual to troubleshoot common problems.
2. Verify that no circuit breakers have been tripped. A tripped circuit breaker is the most common UPS problem!
3. If the problem persists, contact APC Customer Support by referring to “How to Contact APC” on page 168.
4. Note the model number of the product, the serial number, and the date purchased. A technician will ask you to describe the problem and try to solve it over the phone, if possible. If this is not possible the technician will issue a returned material authorization (RMA) number.



Note If the equipment is under warranty, repairs are free. If not, there is a repair charge. Warranty information appears on page 165.

5. Pack the equipment in its original packaging. If the original packing is not available, ask Customer Service about obtaining a new set.
6. For information on how to pack a Symmetra 3-Phase UPS, refer to “Handling and transport” on page 155.
7. Pack the product properly to avoid damage in transit. Never use polystyrene beads for packaging. Damage sustained in transit is not covered under warranty.
8. Mark the RMA number on the outside of the package.
9. Return the equipment by insured, prepaid carrier to the address given to you by Customer Service.

How to Contact APC

APC Worldwide Customer Support

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

- Visit the APC Web site to find answers to frequently asked questions (FAQs), to access documents in the APC Knowledge Base, and to submit customer support requests.
 - www.apc.com (Corporate Headquarters)
 - Connect to localized APC Web sites for specific countries, each of which provides customer support information.
 - www.apc.com/support/
 - Global support with FAQs, knowledge base, and e-support.
 - Contact an APC Customer Support center by telephone or e-mail.
 - Regional centers:

APC Corporate Headquarters (U.S. and Canada)	(800) 800-4272 (toll-free)
Latin America	(1) (401) 789-5735 (United States)
Europe, Middle East, Africa	(353) (91) 702020 (Ireland)
Japan	(03) 5434-2021 Guidance 3

- Local, country-specific centers: go to www.apc.com/support/contact for contact information.
- Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

Document Information

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Revision

Part number: 990-7823; November 2001