



02/20/2001

POWERWARE® 9150

User's Guide

8 kVA - 12.5 kVA

FCC Statement

The Powerware® 9150 UPS configurations vary. Some configurations may or may not be classified by the Federal Communications Commission (FCC) as a Class A device. If your Powerware 9150 unit is classified by these standards, the corresponding information applies:

Class A

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

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CHAPTER 1

INTRODUCTION

The Powerware® 9150 is a double-conversion, online uninterruptible power supply (UPS) for protecting computer systems and other intelligent devices.

The UPS provides a steady, well-regulated power supply for your computing and communications equipment, while protecting it from the frequent irregularities that are inherent in commercially available power. Voltage spikes, power surges, brownouts, and power failures have the potential to corrupt critical data, destroy unsaved work sessions, and in some instances, damage expensive hardware.

With the Powerware 9150, you can safely eliminate the effects of electrical line disturbances and guard the integrity of your systems and equipment. Figure 1 shows the Powerware 9150 UPS.

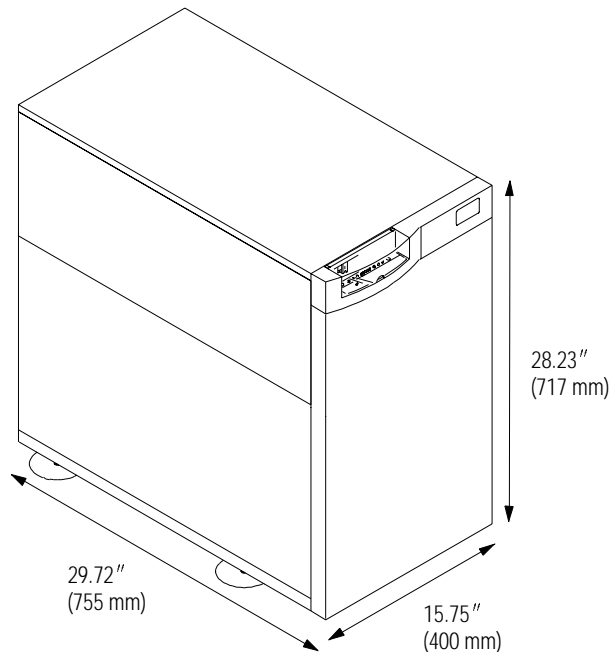


Figure 1. The Powerware 9150 UPS

UPS Model and Battery Configurations

There are two important considerations when selecting the UPS model and battery configuration to properly safeguard your equipment:

- The UPS output power rating (VA) should be specified according to the total power demand of the equipment to be protected. Some margin should be allowed for potential expansion of the protected system, and for possible inaccuracy in calculating or measuring the actual power requirement.
- The battery should be sized according to the desired backup time. The backup time is longer if the load is less than the nominal power rating of the UPS.

Load Requirements

Determine the total load requirements, in volt-amperes (VA), of the equipment to be protected by the UPS. The UPS load should not exceed the UPS rating. To determine the total load requirements:

1. Obtain the load ratings from either the nameplate or operator's manual of the equipment to be protected by the UPS. The ratings are listed in either watts (W), amperes or amperes max (A), or volt-amperes.
2. If the rating is in watts, multiply by 1.4 to obtain the VA requirement (this is the typical relationship between watts and volt-ampere ratings in most computing equipment).
If the rating is in amperes or amperes max, multiply by the input voltage to obtain the VA requirement.
3. Add all of the resultant VA ratings together to obtain the total load requirements of the equipment to be protected (see Figure 2).

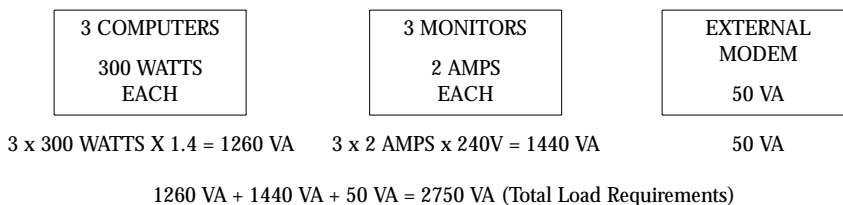


Figure 2. Volt-Amperes Calculation Example

If the total load requirements of the equipment exceeds the capacity of the UPS, you must either reduce the number of pieces of equipment, or use a UPS with a larger load capacity.



NOTE Line-to-neutral loads (100V - 127V) should be balanced between L1/A and L2/B.

When deciding on which pieces of equipment to remove from the UPS, select equipment that has a lower priority for power protection. Computers, monitors, and modems typically have a higher priority because they could be processing or transmitting data when a power outage occurs.

Battery Times

The Powerware 9150 UPS has internal batteries with run times up to 17 minutes. If additional run time is required, optional external battery cabinets (EBCs) can be purchased. There are two EBC models available: EBC-48 and EBC-96. The EBC-48 model contains 48 batteries and the EBC-96 model contains 96 batteries. The following table shows approximate battery times for both internal battery models and the optional EBC configurations. The times shown in the EBC rows are cumulative and include the internal battery time.

Powerware 9150 Approximate Battery Times (in Minutes at Full Load)				
		Model 8 kVA	Model 10 kVA	Model 12.5 kVA
UPS with Internal Batteries	32 Batteries*	10	8	
	48 Batteries	17	13	9
1 EBC-48 Cabinet		41	31	23
1 EBC-96 Cabinet		69	52	40
2 EBC-96 Cabinets		133	101	77
3 EBC-96 Cabinets		206	157	119
4 EBC-96 Cabinets		284	217	165
5 EBC-96 Cabinets		368	281	213

*EBCs are not available for the 32-battery model. Refer to the serial nameplate; if DC voltage on the nameplate is 192V, EBCs cannot be used. To use EBCs, DC voltage must be 288V.

If a power failure outlasts the backup time, the UPS shuts down in order to prevent a total discharge of the battery. When utility is restored, the UPS starts automatically, providing power to the critical load and charging the battery bank.



CHAPTER 2

SAFETY WARNINGS

The only user operations permitted are:

- Starting up and shutting down the UPS
- Operating the user interface
- Connecting data interface cables
- Monitoring the UPS with power management software

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

These operations must be performed according to the instructions in this manual. During any of these operations, you must perform only the listed operations. Any deviation from the instructions could be dangerous.

IMPORTANT SAFETY INSTRUCTIONS

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

DANGER



This UPS contains **LETHAL VOLTAGES**. All repairs and service should be performed by **AUTHORIZED SERVICE PERSONNEL ONLY**. There are **NO USER SERVICEABLE PARTS** inside the UPS.

CAUTION



- Output overcurrent protection and disconnect switch must be provided by others (see table on page 21).
 - To reduce the risk of fire, connect only to a circuit provided with 70 amperes maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70 (see table on page 21).
 - Batteries can present a risk of electrical shock or burn from high short circuit current. Observe proper precautions. Servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries.
 - Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
 - This UPS contains its own energy source (batteries). The UPS output may carry live voltage even when the UPS is not connected to an AC supply.
 - Never dispose of batteries in a fire. Batteries may explode when exposed to flame.
 - To reduce the risk of fire or electric shock, install this UPS in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 104°F (40°C). Do not operate near water or excessive humidity (95% max).
-

Sikkerhedsanvisninger

FARE



Denne UPS (ubrudt strømforsyning) indeholder LIVSFARLIG SPÆNDING. Al reparation og service bør KUN foretages af AUTORISERET SERVICEPERSONALE. Der er INGEN DELE i UPS'en, hvorpå en BRUGER BØR FORETAGE SERVICE.

ADVARSEL



- Batterier kan give risiko til elektrisk stød eller forbrænding fra stærk kortslutningsstrøm. Observer korrekte forholdsregler.
 - Korrekt afkastning af batterier kræves. Henvend Dem til deres lokale love m.h.t. affaldsreguleringer.
 - Denne UPS indeholder en selvforsynende energikilde (batterier). Udgangskontakterne kan overføre strømførende spænding, når UPS'en ikke er forbundet med en vekselstrømforsyning.
 - Brænd aldrig batterierne. Batterierne kan eksplodere, når de udsættes for flammer.
 - Installer UPS'en i et temperatur- og fugtighedskontrolleret miljø frit for konduktiverende materiale for, at reducere risikoen for brand og elektrisk stød. Omgivelsestemperaturen må ikke overskride 40°C. Betjen ikke udstyrer i nærheden af vand eller urimelig fugtighed (95% maksimum).
-

Belangrijke Veiligheidsinstructies



GEVAAR

Deze UPS bevat LEVENSGEVAARLIJKE ELEKTRISCHE SPANNING. Alle reparaties en onderhoud dienen UITSLUITEND DOOR ERKEND SERVICEPERSONEEL te worden uitgevoerd. Er bevinden zich GEEN ONDERDELEN in de UPS die DOOR DE GEBRUIKER kunnen worden GEREPAREERD.



OPGELET

- Batterijen kunnen gevaar voor elektrische schok of brandwonden veroorzaken als gevolg van hoge kortsluitstroom. Volg de desbetreffende aanwijzingen op.
 - De batterijen moeten op de juiste wijze worden opgeruimd. Raadpleeg hiervoor uw plaatselijke voorschriften.
 - Deze UPS bevat zijn eigen energiebron (batterijen). De uitvoercontactdozen kunnen onder spanning staan wanneer de UPS niet op een wisselstroom voeding is aangesloten.
 - Nooit batterijen in het vuur gooien. De batterijen kunnen ontploffen.
 - Teneinde de kans op brand of elektrische schok te verminderen dient deze UPS in een gebouw met temperatuur- en vochtigheidsregeling te worden geïnstalleerd, waar geen geleidende verontreinigingen aanwezig zijn. De omgevingstemperatuur mag 40°C niet overschrijden. Niet gebruiken in de buurt van water of bij zeer hoge vochtigheid (max. 95%).
-

Tärkeitä turvaohjeita

VAARA



Tämä UPS sisältää HENGENVAARALLISIA JÄNNITTEITÄ. Kaikki korjaukset ja huollot on jätettävä VAIN VALTUUTETUN HUOLTOHENKILÖSTÖN TOIMEKSI. Tämä UPS ei sisällä MITÄÄN KÄYTTÄJÄN HUOLLETTAVIA OSIA.

VARO



- Akusto saattaa aiheuttaa sähköiskun vaaran tai syttyä tuleen mikäli akusto kytketään oikosulkuun. Noudata asianmukaisia ohjeita.
 - Akusto täytyy hävittää säädösten mukaisella tavalla. Noudata paikallisia määräyksiä.
 - Tämä UPS sisältää oman energialähteen (akuston). Ulostulorasioissa voi olla jännite, kun UPS ei ole liitettynä verkkojännitteeseen.
 - Älä koskaan heitä akkuja tuleen. Ne voivat räjähtää.
 - Vähentääksesi tulipalon ja sähköiskun vaaraa asenna tämä UPS sisätiloihin, joissa lämpötila ja kosteus on säädettävissä ja joissa ei ole sähköä johtavia epäpuhtauksia. Ympäristön lämpötila ei saa ylittää 40°C. Älä käytä lähellä vettä tai liian kosteissa oloissa (95 % maksimi).
-

Consignes de Sécurité

Consignes Importantes De Sécurité - Conserver Ces Instructions Cette Notice Contient Des Consignes Importantes De Sécurité

ATTENTION!



Cet UPS contient des tensions mortelles. Toute opération d'entretien et de réparation doit être effectuée **UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ AGRÉÉ**. L'UPS n'a **AUCUNE PIÈCE RÉPARABLE PAR L'UTILISATEUR**.

DANGER!



- Une batterie peut présenter un risque de choc électrique ou de brûlure par un transfert d'énergie ou un court-circuit. Prendre les précautions nécessaires.
 - Une mise au rebut réglementaire des batteries est obligatoire. Consulter les règlements en vigueur dans votre localité concernant la mise au rebut de batteries.
 - Cet UPS contient sa propre source d'énergie (batteries). Les prises de sortie peuvent être sous tension même lorsque l'UPS n'est pas branché sur le secteur.
 - Ne jamais se débarrasser de batteries en les incinérant. Elles risquent d'exploser lorsqu'elles sont exposées à une flamme.
 - Afin de réduire les risques d'incendie et de choc électrique, installer l'UPS uniquement dans un espace intérieur à température et humidité contrôlées et sans matériel conducteur. La température ambiante ne doit pas dépasser 40°C. Ne pas utiliser à proximité d'eau ou dans une atmosphère excessivement humide (95 % max).
-

Wichtige Sicherheitsanweisungen

WARNUNG



Lebensgefahr! Diese USV enthält TÖDLICHE SPANNUNGEN! Alle Reparatur- und Wartungsarbeiten sollten NUR VON AUTORISIERTEM WARTUNGSPERSONAL durchgeführt werden. In dieser USV befinden sich KEINE VOM BENUTZER ZU WARTENDEN TEILE.

VORSICHT!



- Batterien können aufgrund von Kurzschlußhochstrom Elektroschocks oder Verbrennungen verursachen. Entsprechende Anleitungen befolgen.
 - Die Batterien müssen ordnungsgemäß weggeworfen werden. Entsorgungsanweisungen sind den örtlichen Vorschriften zu entnehmen.
 - Diese USV enthält ihre eigene Stromquelle (Batterien). An den Ausgangssteckdosen kann Spannung anliegen, selbst wenn die USV nicht an eine Wechselspannungsquelle angeschlossen ist.
 - Batterien niemals verbrennen, da sie explodieren können.
 - Um die Brand- oder Elektroschockgefahr zu verringern, diese USV nur in Gebäuden mit kontrollierter Temperatur und Luftfeuchtigkeit installieren, in denen keine leitenden Schmutzstoffen vorhanden sind. Die Umgebungstemperatur darf 40°C nicht übersteigen. Die USV nicht in der Nähe von Wasser oder in extrem hoher Luftfeuchtigkeit (max. 95 %) betreiben.
-

Importanti istruzioni di sicurezza



PERICOLO

La TENSIONE contenuta in questo gruppo statico di continuità è LETALE. Tutte le operazioni di riparazione e di manutenzione devono essere effettuate ESCLUSIVAMENTE DA PERSONALE TECNICO AUTORIZZATO. All'interno del gruppo statico di continuità NON vi sono PARTI RIPARABILI DALL'UTENTE.



ATTENZIONE

- Le batterie possono presentare rischio di scossa elettrica o di ustioni provocate da alta corrente dovuta a corto circuito. Osservare le apposite istruzioni.
 - Le batterie devono essere smaltite in modo corretto. Per i requisiti di smaltimento fare riferimento alle disposizioni locali.
 - Questo gruppo statico di continuità contiene una fonte di energia autonoma (le batterie). Le prese di uscita possono condurre tensione energizzata quando il gruppo statico di continuità non è collegato con una fonte di alimentazione a corrente alternata.
 - Non gettare mai le batterie nel fuoco poichè potrebbero esplodere se esposte alle fiamme.
 - Per ridurre il rischio di incendio o di scossa elettrica, installare il gruppo statico di continuità in un ambiente interno a temperatura ed umidità controllata, privo di agenti contaminanti conduttivi. La temperatura ambiente non deve superare i 40°C. Non utilizzare l'unità in prossimità di acqua o in presenza di umidità eccessiva (95% max).
-

Viktig Sikkerhetsinformasjon

FARLIG



Denne UPS'en inneholder LIVSFARLIGE SPENNINGER. All reparasjon og service må kun utføres av AUTORISERT SERVICEPERSONALE. BRUKERE KAN IKKE UTFØRE SERVICE PÅ NOEN AV DELENE i UPS'en.

FORSIKTIG



- Batterier kan forårsake elektriske støt eller forbrenning på grunn av høy kortslutningsstrøm. Følg instruksene.
 - Batterier må fjernes på korrekt måte. Se lokale forskrifter vedrørende krav om fjerning av batterier.
 - Denne UPS'en har en egen energikilde (batterier). Stikkontaktene kan være strømførende selv om UPS'en ikke er tilsluttet en vekselstrømforsyning.
 - Kast aldri batterier i flammer, da de kan eksplodere, hvis de utsettes for åpen ild.
 - For å redusere fare for brann eller elektriske støt, bør denne UPS'en installeres i et innendørs miljø med kontrollert temperatur og luftfuktighet som er fritt for ledende, forurensende stoffer. Romtemperaturen må ikke overskride 40°C. Den må ikke brukes i nærheten av vann eller ved meget høy luftfuktighet (95% maks.).
-

Regulamentos de Segurança

CUIDADO



O UPS contém VOLTAGEM MORTAL. Todos os reparos e assistência técnica devem ser executados SOMENTE POR PESSOAL DA ASSISTÊNCIA TÉCNICA AUTORIZADO. Não há nenhuma PEÇA QUE POSSA SER REPARADA PELO USUÁRIO dentro do UPS.

PERIGO



- As baterias podem apresentar o risco de choque elétrico, ou queimaduras provenientes de alta corrente de curto-circuito. Observe as instruções adequadas.
 - Siga os devidos regulamentos ao desfazer-se das baterias. Consulte os códigos do local para maiores informações sobre os regulamentos de descarte de produtos.
 - Este UPS contém sua própria fonte de energia (baterias). Os receptáculos de saída podem conter voltagem ativa quando o UPS não se encontra conectado a uma fonte de alimentação de corrente alternada.
 - Nunca se desfaça das baterias jogando-as no fogo. Há risco de explosão quando expostas à chamas.
 - Para reduzir o risco de incêndios ou choques elétricos, instale o UPS em ambiente interno com temperatura e umidade controladas e livres de contaminadores condutíveis. A temperatura ambiente não deve exceder 40°C. Não opere-o próximo a água ou em umidade excessiva (máx: 95%).
-

Requisitos de seguridad

PELIGRO



Este UPS (suministro de alimentación permanente) contiene VOLTAJES LETALES. Todas las reparaciones y el servicio técnico deberán ser realizados por PERSONAL DE SERVICIO TÉCNICO AUTORIZADO SOLAMENTE. Este UPS NO CONTIENE PARTES QUE PUEDAN SER REPARADAS POR EL USUARIO.

PRECAUCIÓN



- Las baterías pueden presentar un riesgo de descargas eléctricas o de quemaduras debido a la alta corriente de cortocircuito. Preste atención a las instrucciones correspondientes.
 - Es necesario deshacerse de las baterías adecuadamente. Consulte las disposiciones locales para conocer cuáles son los requisitos pertinentes.
 - Este UPS contiene su propia fuente de energía (baterías). Es posible que los receptáculos de salida tengan tensión cuando el UPS no está conectado a un suministro de corriente alterna (CA).
 - Nunca arroje las baterías al fuego ya que pueden explotar cuando son expuestas a las llamas.
 - Para disminuir el riesgo de incendio o descargas eléctricas, instale este UPS en un ambiente interior a temperatura y humedad controladas, y sin contaminantes conductores. La temperatura ambiente no debe superar los 40°C. No lo haga funcionar cerca del agua o de condiciones de humedad excesivas (95% como máximo).
-

Viktig säkerhetsinformation



FARA

Denna UPS-enhet innehåller LIVSFARLIG SPÄNNING. ENDAST AUKTORISERAD SERVICEPERSONAL får utföra reparationer eller service. Det finns inga delar som ANVÄNDAREN KAN UTFÖRA SERVICE PÅ inuti UPS-enheten.



VIKTIGT

- Batterierna kan ge elektriska stötar eller brännskador från hög kortslutningsström. Följ tillämpliga anvisningar.
 - Batterierna måste kasseras enligt anvisningarna i lokal lagstiftning.
 - Denna UPS-enhet har en egen energikälla (batterier). De utgående kontakterna kan vara spänningsförande när UPS-enheten inte är ansluten till en växelströmsenhet.
 - Använda batterier får aldrig brännas upp. De kan explodera.
 - Minska risken för elektriska stötar genom att installera denna UPS-enhet inomhus, där temperatur och luftfuktighet är kontrollerade och där inga ledande föroreningar förekommer. Omgivande temperatur får ej överstiga 40° Celcius. Använd inte utrustningen nära vatten eller vid hög luftfuktighet (max 95%).
-



CHAPTER 3

INSTALLATION

The following section describes UPS storage requirements, UPS setup, and the installation and startup of the UPS. The instructions are intended for the chief operator/system supervisor, electrical consultants, and installation electricians. Local regulations and electrical code must be followed in the UPS installation.

UPS Storage

When storing the UPS and optional cabinets, the following requirements should be met:

- The UPS should be stored in the original packing and shipping carton.
- Avoid temperature and humidity extremes. To maximize battery life, the recommended storage temperature is 59°F (15°C) to 77°F (25°C).
- The equipment must always be protected from moisture and weather.
- For long term storage, the UPS batteries should be charged for at least 8 hours every 6 months to maintain the battery charge.

UPS Setup

When the UPS is in use, allow a minimum of 4 inches (100 mm) for ventilation on both sides, top, and rear of the UPS (see Figure 3). When the UPS is serviced, allow 30 inches (762 mm) for removal of the UPS left panel. Maintain clearance in front of the UPS for user operations. If you have an optional Power Distribution Module (PDM), allow additional space in the rear for the PDM cord connections.

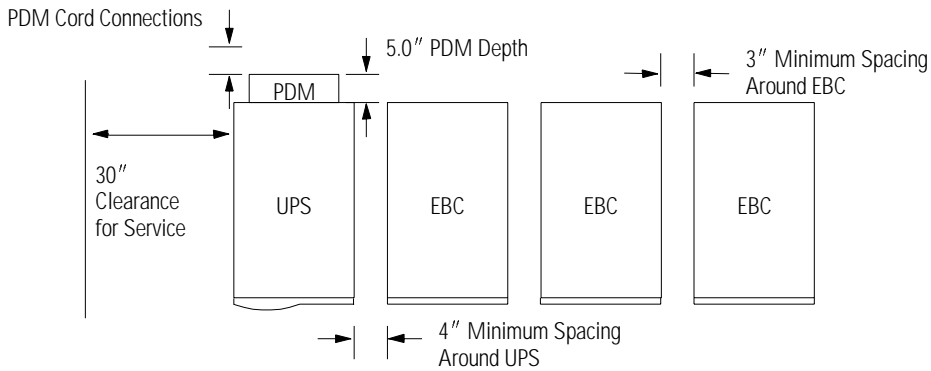


Figure 3. Spacing Requirements (Top View)

Floor Loading

When planning the installation, consider the UPS weight for floor loading. The strength of the installation surface must be adequate for point and distributed loadings. The weights are shown in the following table.

Standard Model Floor Loadings			
Powerware 9150	Maximum Weight (lb)	Point Loading (lb/in ²)	Distributed Loading (lb/ft ²)
Model 8 kVA	550	12.5	170
Model 10 kVA	550	12.5	170
Model 12.5 kVA	550	12.5	170
EBC-48	468	9.6	130
EBC-96	765	17.4	236

Seismic Mounting

The Powerware 9150 has a seismic mounting option. The UPS is shipped with floor mounting brackets instead of the leveling feet. You will need 3/8" hardware (4 bolts per cabinet) to complete the installation. See Figure 4 for a detailed drill and mounting pattern.

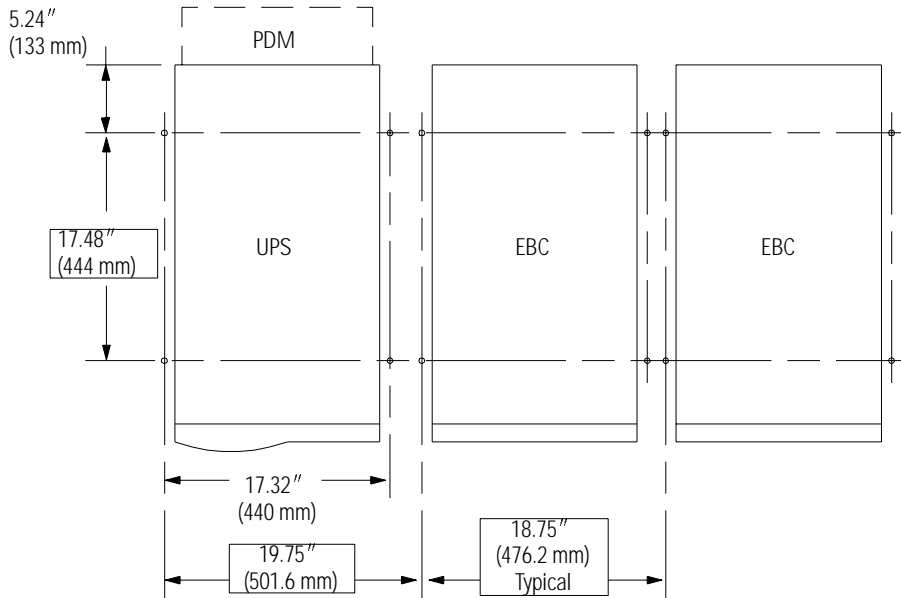
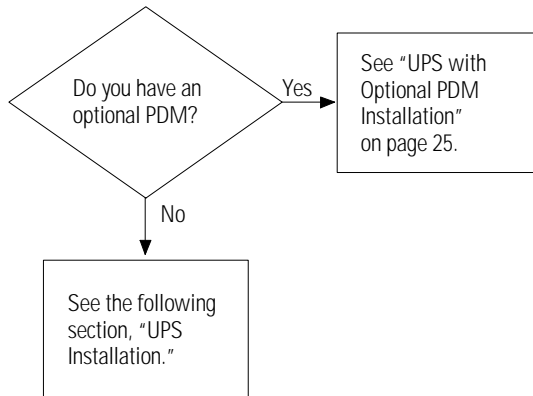


Figure 4. Seismic Mounting Pattern

Selecting an Installation Option

In addition to the standard Powerware 9150, the UPS has an optional PDM. Use the following flow chart to decide which installation option is right for you.



UPS Installation

The Powerware 9150 has the following power connections:

- 2-phase (L1/A and L2/B), neutral, and ground connection for rectifier/bypass input
- 2-phase (L1/A and L2/B), neutral, and ground connection for load output

The nominal input/output voltages are:

- 100/200, 110/220, or 120/240 Vac with 180° phase displacement
- 120/208 or 127/220 Vac with 120° phase displacement

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Use the following procedure to connect utility power and load to the UPS:

1. Verify that the electrical connections to the installation site have been properly installed. Compare the circuit breaker ratings and cable sizes to the ones shown in the terminations table on page 24.
2. A user-supplied, readily-accessible, disconnection device must be incorporated in both the input and output wiring (see the following breaker ratings).

Powerware 9150	Suggested Breaker Ratings	
	Input	Output
Model 8 kVA	50A	50A
Model 10 kVA	60A	60A
Model 12.5 kVA	70A	70A

3. Switch off utility power to the distribution point where the UPS will be connected. Be absolutely sure there is no power.
4. Remove the front panel. Lift from the bottom of the panel and then pull out (see Figure 5).
5. Remove the left side panel of the UPS by unscrewing the two screws and pulling the panel (see Figure 5).

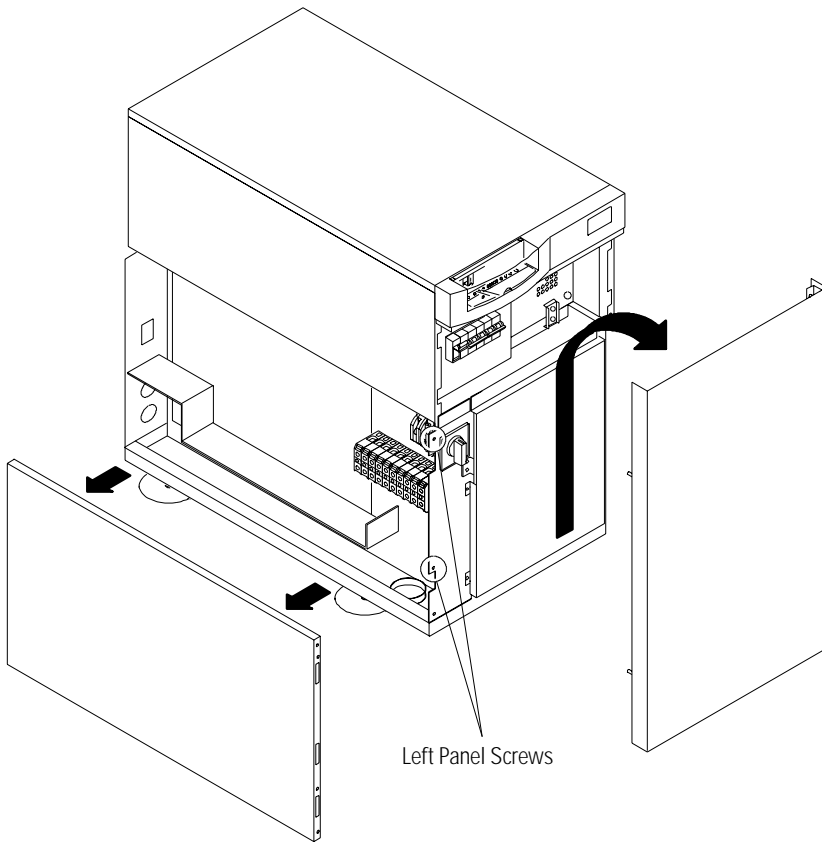


Figure 5. Removing the UPS Panels

6. Verify that the UPS battery breaker CB1 and optional CB2 are in the OFF position (see Figure 6).

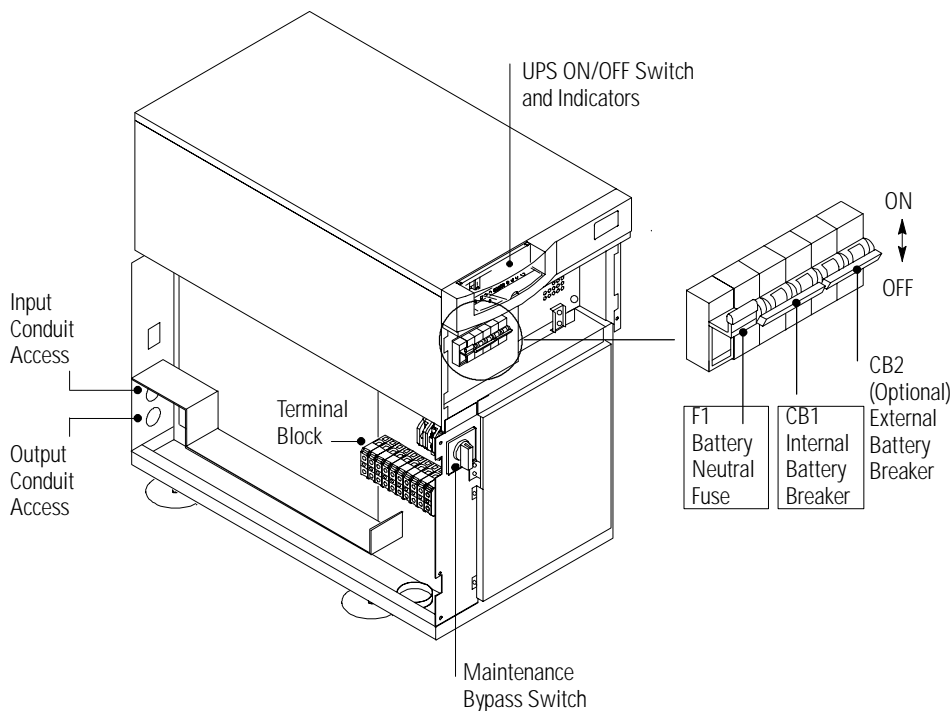


Figure 6. UPS Front and Side View

7. Hardwire the input (TB1-1 through TB1-4) and output (TB1-6 through TB1-9) terminations for the UPS. See the following hardwired terminations table for specifications. See Figure 7 for a detailed view of the terminal blocks.



NOTE The input neutral must be wired for proper operation.

8. Determine your equipment's grounding requirements according to your local electrical code.

Powerware 9150 Hardwired Terminations					
Wire Function	Terminal Position*	Upstream Circuit Breaker	Suggested Wire Size**	Conduit Connection (Entry Size)	
Input	Ground	TB1-1	8 AWG	1-3/4" access hole for 1-1/4" conduit	
	L1/A	TB1-2	70A		4 AWG
	L2/B	TB1-3	70A		4 AWG
	Neutral	TB1-4	2 AWG		
Output	Ground	TB1-6	8 AWG	1-3/4" access hole for 1-1/4" conduit	
	L1/A	TB1-7	4 AWG		
	L2/B	TB1-8	4 AWG		
	Neutral	TB1-9	2 AWG		

*All terminal wire size ratings are 8 - 4 AWG, except TB1-4 and TB1-9 are 8 - 1/0.

**Use 75°C copper wire. Suggested wire size is based on 120/208 full load ratings applied to NEC Code Table 310-16.



NOTE Proper phase rotation must be observed.

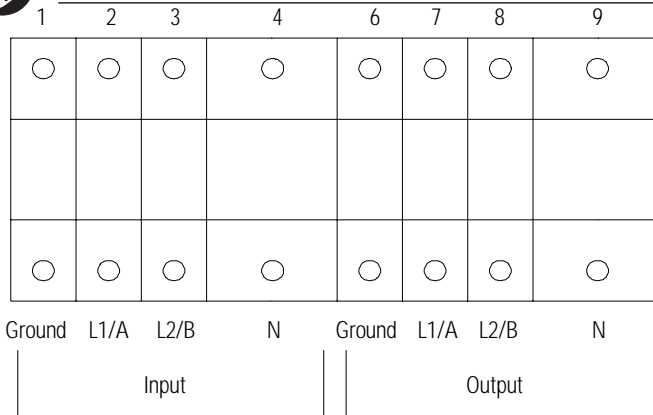


Figure 7. Hardwired Terminal Blocks

9. Reinstall the UPS left side panel. (Do not reinstall the front panel at this time.)
10. Lower the leveling feet to prevent the UPS from rolling (does not apply for seismic mounting installations).
11. If you have additional battery cabinets, continue to “External Battery Cabinet Installation” on page 30. Otherwise, skip to “UPS Startup” on page 33.

UPS with Optional PDM Installation

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Use the following procedure to install the PDM:

1. Switch off utility power to the distribution point where the UPS will be connected. Be absolutely sure there is no power.
2. Remove the front panel. Lift from the bottom of the panel and then pull out (see Figure 8).
3. Remove the left side panel of the UPS by unscrewing the two screws and pulling the panel (see Figure 8).

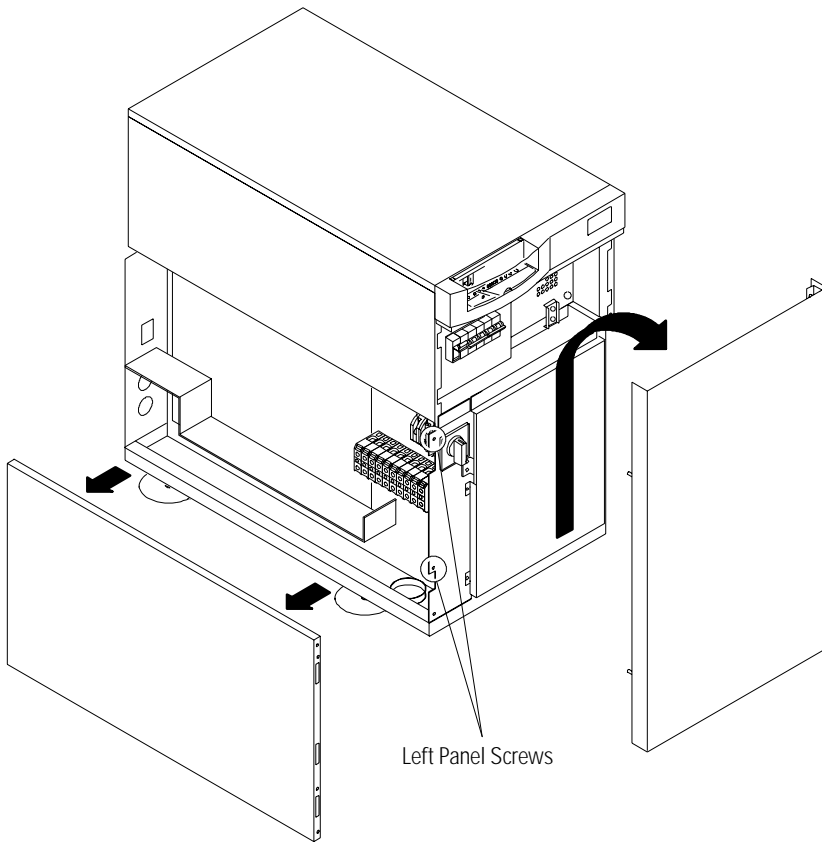


Figure 8. Removing the UPS Panels

4. Verify that the UPS battery breaker CB1 and optional CB2 are in the OFF position (see Figure 9).

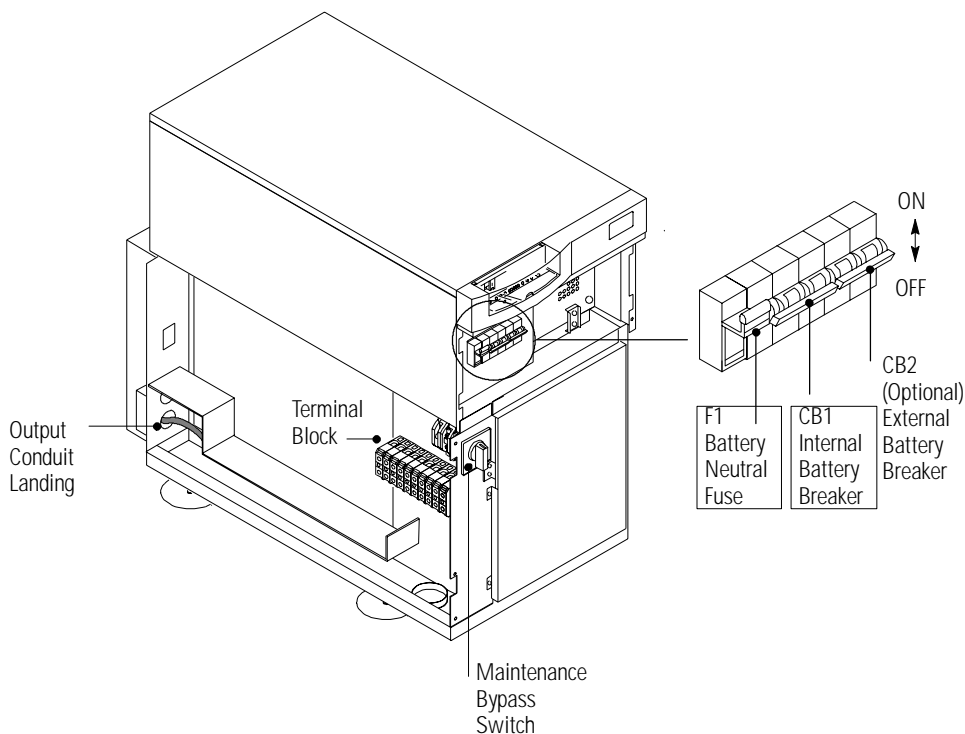


Figure 9. Connecting PDM Wiring to Terminal Block

5. Remove the lower rear panel of the UPS by unscrewing the six screws. Save the screws for reuse; the panel is no longer needed (see Figure 10).
6. Mount the PDM chassis in the spot previously occupied by the rear panel. The wires exiting the PDM should be close to the output conduit landing on the UPS (see Figure 10).

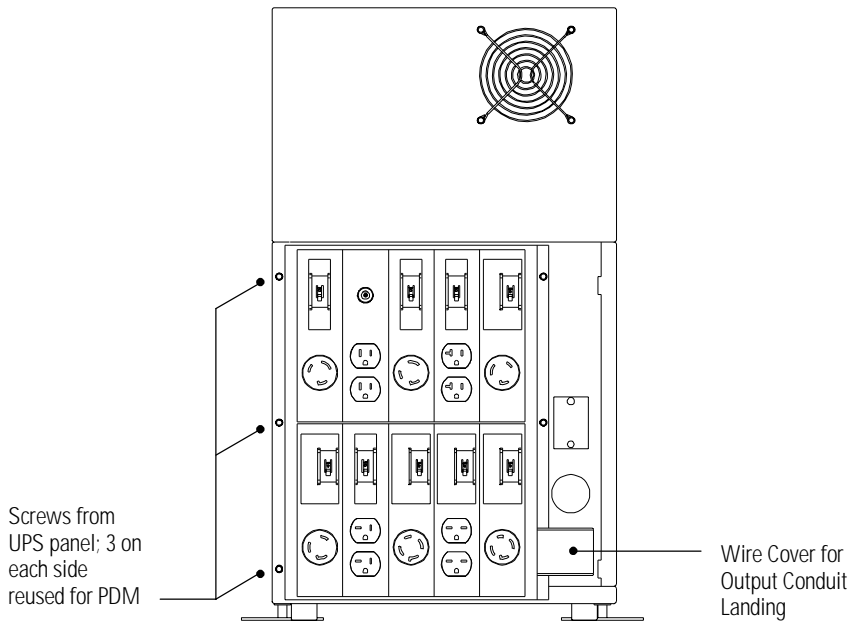


Figure 10. Mounting the PDM to UPS Rear Panel

7. Insert the bushing (provided with the PDM packaging) into the output conduit landing.
8. Hardwire the input (TB1-1 through TB1-4) terminations for the UPS. See the following hardwired terminations table for specifications. See Figure 11 for a detailed view of the terminal blocks.
9. Insert the wires from the PDM into the output conduit landing and connect to the UPS terminal block according to the following table.

Powerware 9150 Hardwired Terminations for Optional PDM				
Wire Function	Terminal Position*	Upstream Circuit Breaker	Suggested Wire Size**	Conduit Connection (Entry Size)
Input				
Ground	TB1-1		8 AWG	
L1/A	TB1-2	70A	4 AWG	1-3/4" access hole for 1-1/4" conduit
L2/B	TB1-3	70A	4 AWG	
Neutral	TB1-4		2 AWG	
Output for PDM			Wire Color	
Ground	TB1-6		Green/Yellow	1-3/4" access hole for 1-1/4" conduit
L1/A	TB1-7		Black	
L2/B	TB1-8		Red	
Neutral	TB1-9		White	

*All terminal wire size ratings are 8 - 4 AWG, except TB1-4 is 8 - 1/0.
 **Use 75°C copper wire. Suggested wire size is based on 120/208 full load ratings applied to NEC Code Table 310-16.



NOTE Proper phase rotation must be observed.

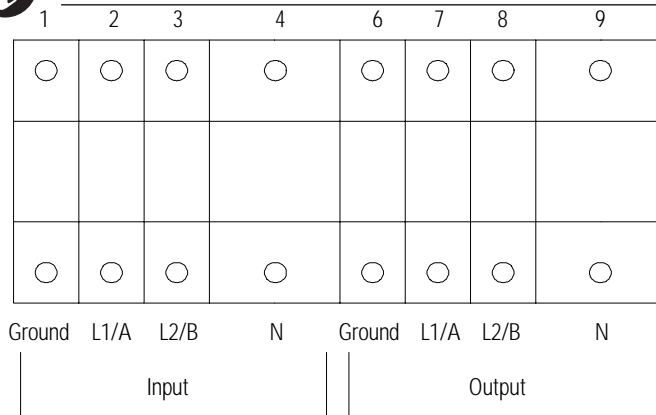


Figure 11. Hardwired Terminal Blocks

10. Connect the wire cover to the PDM using the two screws provided (see Figure 10).
11. Reinstall the UPS left side panel. (Do not reinstall the front panel at this time.)
12. Lower the leveling feet to prevent the UPS from rolling (does not apply for seismic mounting installations).
13. If you have additional battery cabinets, continue to the following “External Battery Cabinet Installation” procedure. Otherwise, skip to “UPS Startup” on page 33.

External Battery Cabinet Installation

The Powerware 9150 UPS has either 32 or 48 internal batteries. EBCs are available for the 48-battery model. Refer to the UPS serial nameplate; the DC voltage on the nameplate must be 288V to add EBCs.

The internal battery charger can support additional EBCs; however, additional battery capacity also extends the recharge time.




NOTE A service representative must change the Battery Size parameter in the nonvolatile memory to reflect the correct number of battery strings after installing EBCs.

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Use the following instructions for installing an EBC with the 48-battery UPS:

1. If the UPS is operating, turn the Maintenance Bypass switch to the BYPASS position and turn off the UPS ON/OFF switch (the  position). See Figure 6 on page 23.
2. Verify the circuit breakers on the UPS are in the OFF position.
3. Facing the UPS, place the battery cabinet to the right of the UPS. Confirm the DC voltage on the nameplate of the UPS and EBC is 288V.
4. Remove the front panel of each EBC. Lift from the bottom of the panel and then pull out (see Figure 12).

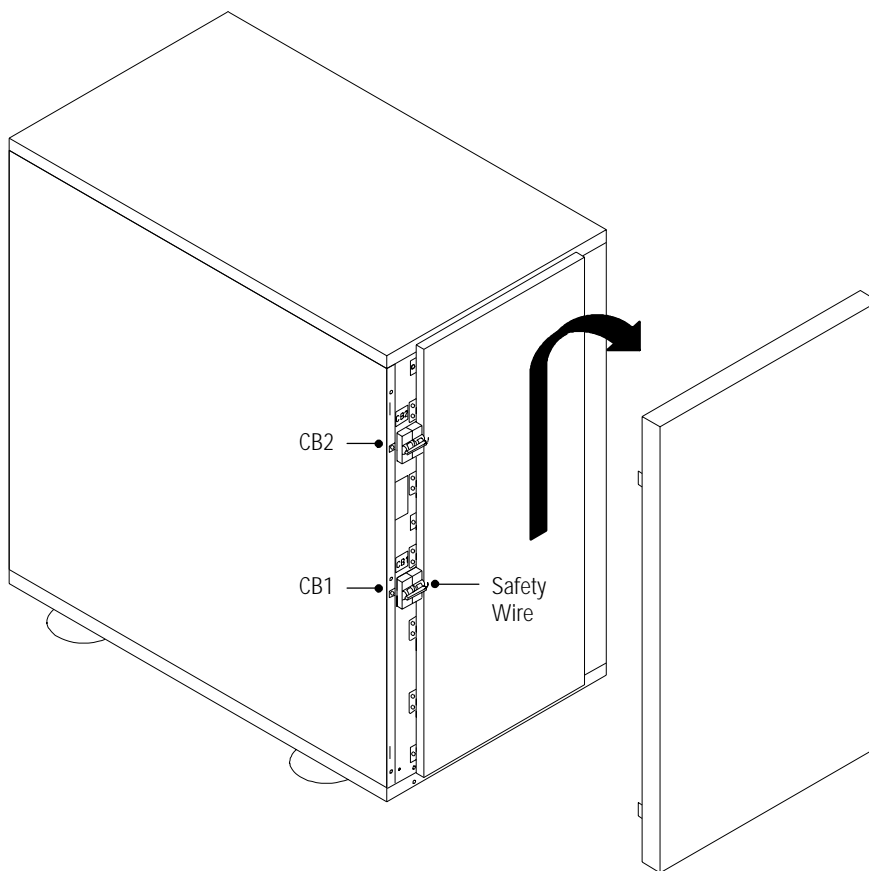


Figure 12. EBC Front Panel

5. Verify that the circuit breakers CB1 and CB2 are in the OFF position on each battery cabinet.
6. Remove the cover plate on the rear of the UPS cabinet (see Figure 13). Pull the battery connector out of the UPS, cut the tie-wrap, and discard the cover plate.

Pull the battery cable from the rear of the battery cabinet and plug it into the battery connector on the UPS rear panel. Rotate the EBC conduit fitting into position (90° angle up).

Push the battery cable into the UPS and secure the EBC cover plate to the UPS rear panel.

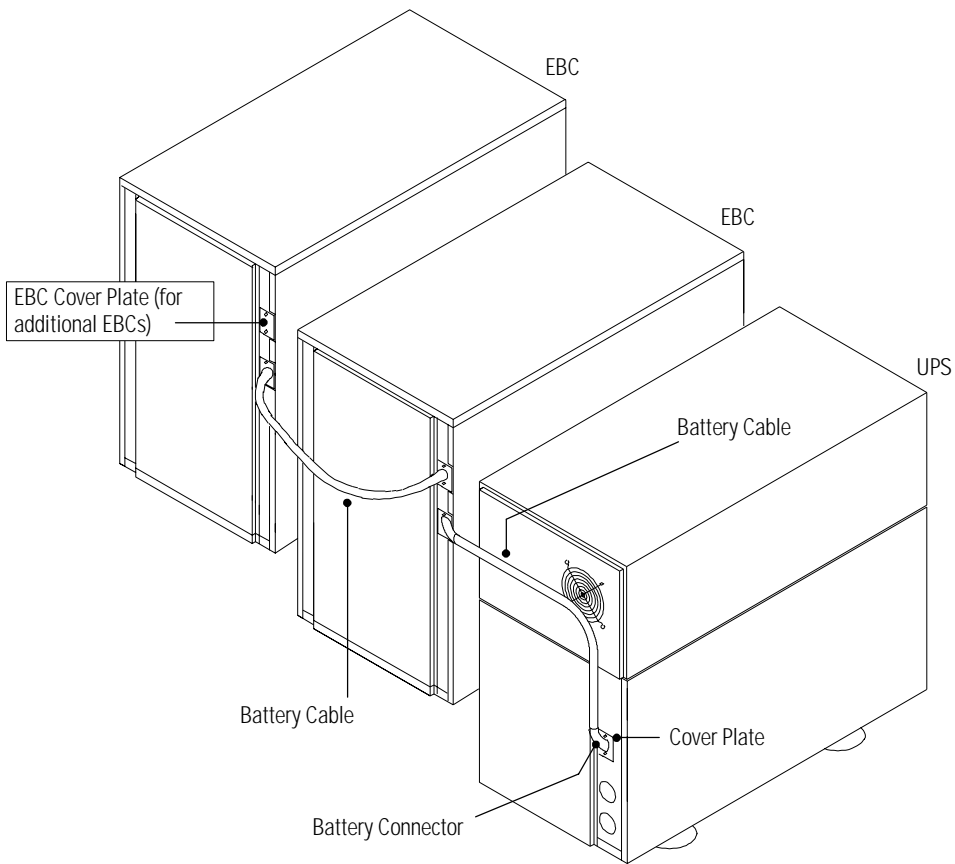


Figure 13. Connecting the EBC

7. If additional battery cabinets are used, remove the EBC cover plate on the first battery cabinet. Pull the battery connector out of the EBC, cut the tie-wrap, and discard the cover plate. Plug the battery cable from the second EBC into the battery connector of the first EBC and secure the cover plate. Follow this procedure for each battery cabinet.
8. Disconnect the safety wire from the circuit breakers on each battery cabinet and switch the breakers to the ON position (see Figure 12).
9. Reinstall the EBC front panel(s).

10. Lower the leveling feet to prevent the EBC from rolling (does not apply for seismic mounting installations).
11. Continue to the following “UPS Startup” procedure.

UPS Startup

WARNING



Only qualified service personnel (such as a licensed electrician) should perform the UPS installation and initial startup. Risk of electrical shock.

Verify that UPS installation has been carried out correctly and the UPS ground has been connected. Figure 6 on page 23 and Figure 14 on page 39 show the location of the switches and breakers.



NOTE Bypass startup is recommended whenever the load is connected to the UPS.

Bypass Startup

You can start up the UPS in Bypass, allowing utility to power the load. To start up the UPS with the Maintenance Bypass switch in the BYPASS position:

1. Remove the front panel. Lift from the bottom of the panel and then pull out (see Figure 5 on page 22).
2. Verify that the Maintenance Bypass switch is in the BYPASS position.
3. Switch on utility power where the UPS is connected. The load is now powered by the utility.
4. Turn the UPS battery circuit breaker CB1 and optional CB2 to the ON position.
5. Turn the Maintenance Bypass switch to the SERVICE position.
6. Start the UPS by turning on the UPS ON/OFF switch (the | position).

The UPS checks its internal functions, synchronizes to utility, performs input voltage and frequency checks, and supplies power to the output. The UPS starts in approximately three to five minutes. The UPS ON, LINE ON, BYPASSED, and LOAD indicators illuminate.

If the UPS does not start and an LED other than the UPS ON indicator is blinking, the UPS is in Automatic Configuration Mode (see page 36).

CAUTION



Do not rotate the Maintenance Bypass switch to the UPS position until the UPS ON, LINE ON, BYPASSED, and LOAD indicators illuminate; otherwise, it could cause a power loss to your equipment.

7. Turn the Maintenance Bypass switch to the UPS position.
The BYPASSED indicator turns off when power transfers to the inverter. The UPS is now powering the load.
8. Reinstall the front panel.

Normal Mode Startup

To start up the UPS with the Maintenance Bypass switch in the UPS position:

1. Remove the front panel. Lift from the bottom of the panel and then pull out (see Figure 5 on page 22).
2. Verify that the Maintenance Bypass switch is in the UPS position.
3. Switch on utility power where the UPS is connected.
4. Turn the UPS battery circuit breaker CB1 and optional CB2 to the ON position.
5. Start the UPS by turning on the UPS ON/OFF switch (the | position).

The UPS checks its internal functions, synchronizes to utility, and supplies power to the output. The UPS starts in approximately three to five minutes. The UPS ON, LINE ON, and LOAD indicators illuminate.

If the UPS does not start and an LED other than the UPS ON indicator is blinking, the UPS is in Automatic Configuration Mode (see page 36).

6. Reinstall the front panel.

UPS Startup on Battery



NOTE Before using this feature, the UPS must have been powered by utility power at least once so that the UPS can auto-detect the frequency (50 or 60 Hz).

1. Remove the front panel. Lift from the bottom of the panel and then pull out (see Figure 5 on page 22).
2. Verify that the Maintenance Bypass switch is in the UPS position.
3. Turn the UPS battery breaker CB1 and optional CB2 to the ON position. If you have additional battery cabinets, turn the circuit breakers on all battery cabinets to the ON position.
4. Start the UPS by turning on the UPS ON/OFF switch (the | position).
5. Press the Battery Start pushbutton below the UPS control panel (see Figure 14 on page 39) and hold for approximately five seconds.

The UPS checks its internal functions and supplies power to the output. The UPS starts in approximately one minute. The UPS ON, ON BATTERY, and LOAD indicators illuminate. The audible alarm sounds; press the RESET pushbutton on the LED panel to clear the alarm.

6. Reinstall the front panel.

Configuring Voltage and Frequency

The UPS automatically attempts to match the voltage and frequency to the existing utility. If the UPS is unsuccessful or if you want to bypass the automatic configuration, the voltage and frequency can be selected manually.

Automatic Configuration Mode

Automatic configuration is performed only during the initial UPS startup or during a bypass startup. The UPS attempts to match voltage and frequency to the existing utility.

When the input voltage and frequency have been determined, the UPS beeps twice and cycles through all the LEDs. One of the LEDs remains blinking. The blinking LED shows the configuration which has been automatically selected (see the configuration table on page 37).



CAUTION

Verify that the LED corresponds with the correct input voltage.

The UPS is factory-configured for 120/208V, 60 Hz. The UPS continues to start up, depending on the automatic selection:



NOTE When the LED indicating the automatic selection blinks for 10 seconds during startup, you can press the RESET pushbutton on the LED panel to interrupt the UPS startup and switch to Manual Configuration Mode (see Steps 2 through 4 on page 37).



- If the automatic selection is the same as the factory configuration, the LED blinks for only 10 seconds. The LEDs cycle again and the UPS starts up.
- If the automatic selection differs from the factory configuration, the UPS does not start and the corresponding LED blinks.

To accept the automatic selection, press the RESET pushbutton momentarily to store this selection in the UPS. The UPS beeps twice and cycles through the LEDs. The LED indicating the automatic selection blinks for 10 seconds and the UPS continues to start up.

To cancel the automatic startup, press and hold the RESET pushbutton for longer than three seconds. The UPS beeps twice and goes to Manual Configuration Mode (see Steps 2 through 4 on page 37).

Manual Configuration Mode

To change the nominal output voltage and frequency from the front panel:

1. If the UPS is operating in Normal Mode, turn off the UPS ON/OFF switch (the  position). Then press and hold the RESET pushbutton on the LED panel while turning on the UPS ON/OFF switch (the  position). Continue to hold the RESET pushbutton until the LEDs begin to cycle right to left and then release.
2. One of the LEDs remains blinking. The blinking LED shows the current configuration according to the following table.

Blinking LED	Configuration	
	Input/Output Voltage	Output Frequency
ALARM	120/208V	50 Hz
SERVICE	110/220V	50 Hz
OVERTEMP	127/220V	50 Hz
OVERLOAD	100/200V	50 Hz
80%	120/240V	50 Hz
60%	120/208V	60 Hz
40%	110/220V	60 Hz
LOAD	127/220V	60 Hz
BYPASSED	100/200V	60 Hz
ON BATTERY	120/240V	60 Hz

3. Press the RESET pushbutton quickly to scroll through the configuration options. Each time you press the button, the next LED blinks.
4. When the correct setting is blinking, press and hold the RESET pushbutton until the alarm beeps twice (approximately three seconds). The UPS indicates successful configuration by sequencing all the LEDs.



CHAPTER 4

OPERATION

This chapter contains information on how to use the Powerware 9150, including UPS shutdown, maintenance bypass operation, and UPS communication.

Control Panel Functions

The control panel contains the UPS ON/OFF switch, the Battery Start pushbutton, and the LED panel. The control panel shows the status of the operation and generates an audible alarm (see Figure 14). The LED panel contains the UPS indicators and the RESET pushbutton (see Figure 15).

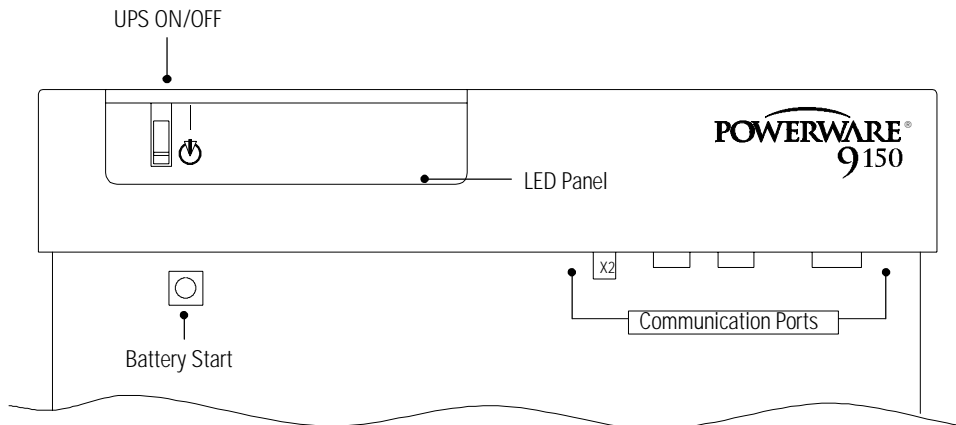


Figure 14. Powerware 9150 Control Panel

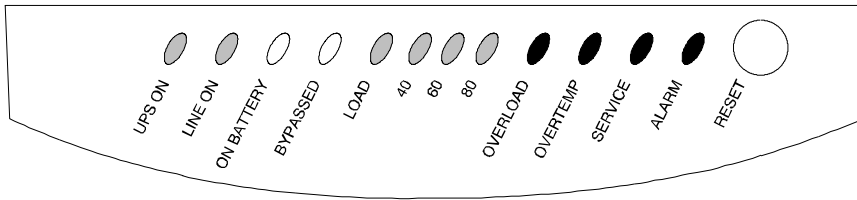


Figure 15. LED Panel

The following table shows the LED status and description.

LED	Status	Description
UPS ON	On	UPS is operating normally.
	Blinking	UPS is starting up or is shut down and waiting for power to return.
	Off	UPS is turned off and will not turn on automatically.
LINE ON	On	The utility voltage is acceptable for UPS and BYPASS operation.
	Off	The utility voltage is not acceptable for BYPASS operation. The UPS may still be operating on utility power.
ON BATTERY	On	UPS is in Battery Mode.
	Blinking	The battery voltage is low and has less than five minutes of backup time left before UPS shutdown.
BYPASSED	On	UPS is in Bypass Mode.
LOAD	On	Output is on.
	Off	No output.
40	On	> 40% load
60	On	> 60% load
80	On	> 80% load
OVERLOAD	On	Power requirements exceed the UPS capacity (greater than 100% of nominal).
	Blinking	Overload condition caused the UPS to shut down.

LED	Status	Description
OVERTEMP	On or Blinking	One of the main UPS components is too hot or the fan has failed.
SERVICE	Blinking	Battery failure, fan failure, or configuration error exists. Contact your service representative. See “Service and Support” on page 57.
ALARM	Blinking	There is a UPS alarm condition. See Chapter 6, “Troubleshooting” on page 55 for additional information.

Operating Modes

The Powerware 9150 block diagram, shown in Figure 16, consists of several modules, each having its own functions:

- The rectifier/charger converts AC-power to DC-power and keeps the battery bank fully charged.
- The inverter converts DC-power back to AC-power, which is delivered to the load.
- The Static Bypass switch transfers the load to bypass when the inverter is overloaded or cannot power the load.
- The filter protects the load from disturbances in the utility when power is supplied through the Static Bypass switch.
- The Maintenance Bypass switch is used to bypass the UPS to utility power during maintenance, service, or startup.

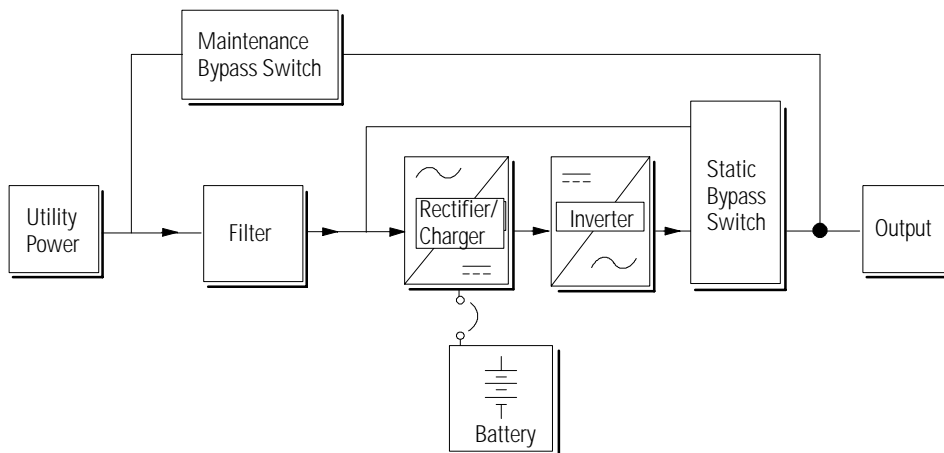


Figure 16. Block Diagram of the Powerware 9150

The Powerware 9150 can operate in Normal, Bypass, or Battery Mode. The UPS automatically switches between these modes as required, and the UPS front panel indicates the current mode of operation.

Normal Mode

When the UPS is in Normal Mode, the UPS ON and LINE ON indicators illuminate. The LOAD indicator(s) display percentage of UPS load capacity being used by the protected equipment.

Bypass Mode

The UPS switches to Bypass Mode in the event of an overload condition, overtemp condition, or UPS failure. When the unit switches to Bypass, a monotone alarm sounds and the BYPASSED indicator illuminates, indicating that the load is powered by utility power. However, utility power continues to be passively filtered by the UPS.

Battery Mode


Battery Mode is automatically initiated if a utility failure occurs or if utility power does not meet preset parameters. The UPS switches to battery (DC) power, providing power to support the load.

When the unit switches to Battery Mode, an alarm beeps for five seconds and the ON BATTERY indicator illuminates, indicating a power outage. The UPS remains in Battery Mode until the utility power returns or until the battery can no longer support the inverter operation.

When the battery can no longer support inverter operation, an audible alarm indicates that approximately five minutes of backup time remains. The time remaining is variable and depends upon battery capacity and loading on the unit. If a power failure outlasts the backup time, the UPS shuts down in order to prevent a total discharge of the battery. When utility is restored, the UPS starts automatically, providing power to the critical load and charging the battery bank.

UPS Shutdown

To shut down the UPS:

1. Remove the front panel. Lift from the bottom of the panel and then pull out (see Figure 17).
2. Turn the Maintenance Bypass switch to the SERVICE or BYPASS position.
3. Turn off the UPS ON/OFF switch (the  position).
4. Turn the UPS battery circuit breaker CB1 and optional CB2 to the OFF position.

The UPS stops supplying power and is disconnected internally from the batteries. The load is powered by the utility.

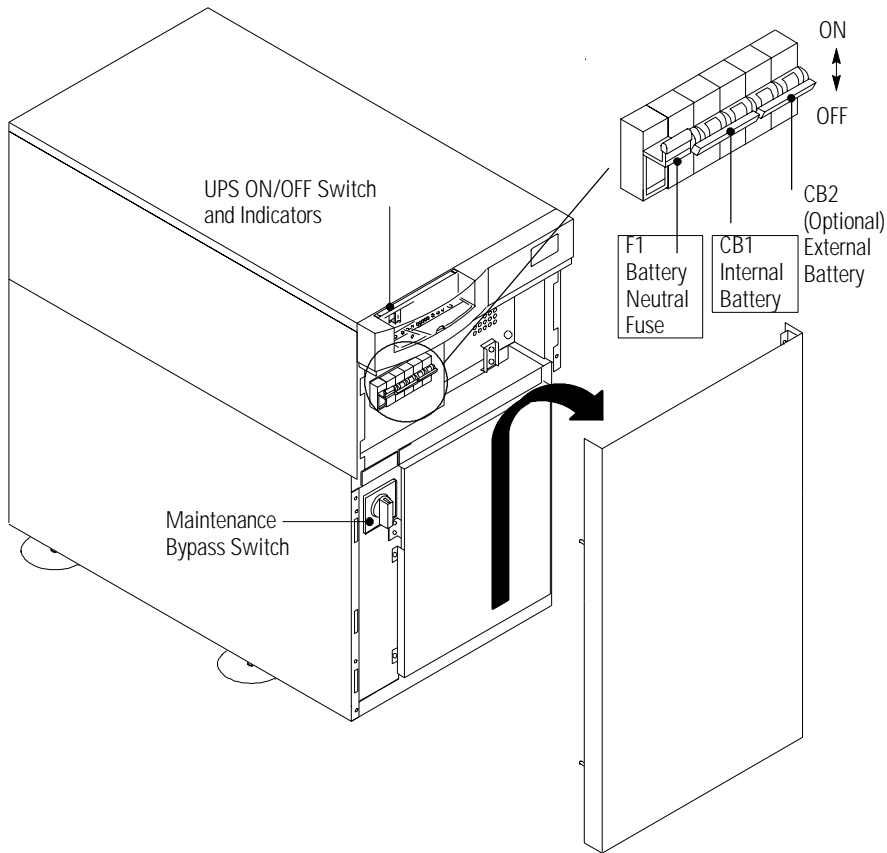


Figure 17. UPS Breakers and Switches (Front Panel Removed)

Using the Maintenance Bypass Switch

The Maintenance Bypass switch is standard on all Powerware 9150 models and is used to bypass the UPS during maintenance or servicing. The Maintenance Bypass switch is located behind the front panel. The SERVICE position on the Maintenance Bypass switch allows a service engineer to apply power to the UPS input and verify its operation while the load is powered through bypass.

WARNING

- If the input frequency is not correct and the UPS is not synchronized to utility power (LINE ON indicator is off), the use of the Maintenance Bypass switch causes a break in the output voltage. Wait until the LINE ON indicator illuminates before using the switch.
 - Do not use the Maintenance Bypass switch if the UPS is configured as a frequency converter (50 Hz in/60 Hz out or 60 Hz in/50 Hz out); it could cause damage to the load.
-

To operate the Maintenance Bypass switch:

1. Check to ensure the LINE ON indicator is on.
2. Turn the Maintenance Bypass switch through the SERVICE position to the BYPASS position. The UPS is now bypassed, with the load powered from utility.

To return to Normal Mode:

1. Turn the Maintenance Bypass switch to the SERVICE position.
2. Turn on the UPS ON/OFF switch (the | position). If the switch is already in this position, turn it off and then on again.

CAUTION

Before turning the Maintenance Bypass switch to the UPS position, verify that the UPS ON, LINE ON, and LOAD indicators are on. This may take three to four minutes.

3. Turn the Maintenance Bypass switch to the UPS position to return to Normal Mode. The UPS is powering the load.

Computer and Alarm Connections

An interface for direct communication with your computer system is supplied in the UPS. The interface consists of two RS-232 serial data interfaces, four isolated alarm contacts, and remote emergency power-off (REPO). These interfaces are located beneath the control panel (see Figure 18).

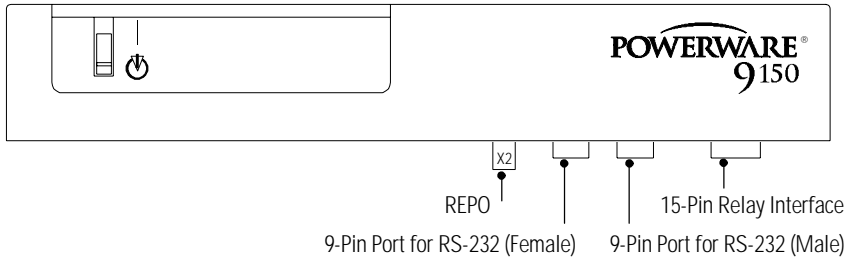


Figure 18. REPO and Serial Port Locations

Hardware Installation

Figure 19 shows the communication cables connected to the UPS. If you have an optional ConnectUPS™ SL Adapter, remove the mounting bracket and reinstall with the adapter in position. Use the female 9-pin UPS serial port for the serial power connector. Follow the instructions in your *ConnectUPS SL Operator's Manual* for configuration.

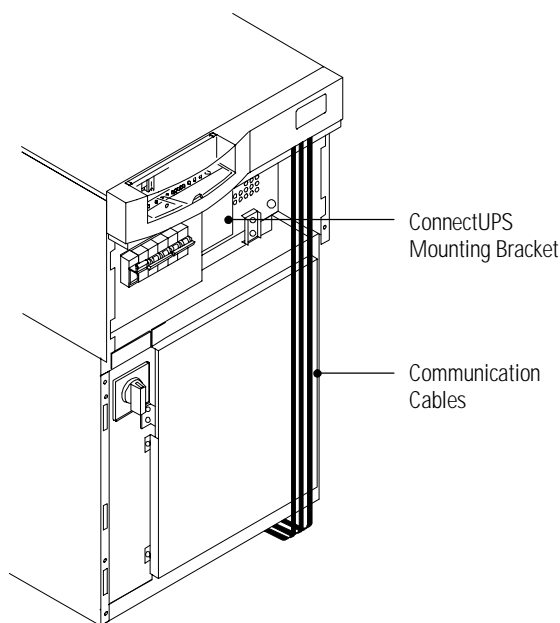


Figure 19. Hardware Connections

RS-232 Serial Data Interfaces

The Powerware 9150 is designed to fully comply with LanSafe III/ FailSafe III Power Management Software and OnliNet® Strategic Power Management Software. If any other software is used, the pin configuration should be verified.

The RS-232 interfaces use 9-pin, D-sub connectors. The information includes data about the utility, the load, and the UPS.



NOTE The RS-232 interface must not be connected to any utility connected circuits. Reinforced insulation to the utility is required. The communications equipment and the UPS should be properly grounded before connecting or disconnecting a communication cable.

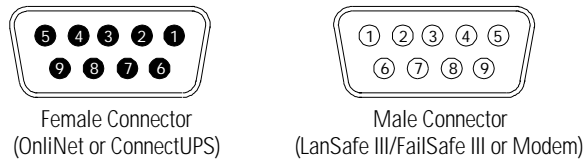


Figure 20. 9-Pin Serial Port

Use the female connector for a computer running OnliNet software or for a ConnectUPS Adapter. The communication settings are 19200 baud, 1 start bit, 8 data bits, No parity, and 1 stop bit. See the following table for pin assignments.

RS-232 Connection (Female)	
Pin 1	Received data
Pin 2	Transmitted data
Pin 3	AC input failure, closing to Pin 4
Pin 4	Signal ground
Pin 5	Impending battery low, closing to Pin 4
Pin 8	+DC auxiliary power
Pin 9	Chassis ground

Use the male connector for a computer running LanSafe III/FailSafe III software or for a modem connection. The communication settings are 1 start bit, 8 data bits, No parity, 1 stop bit, and XON/XOFF. The baud rate is factory-set for 1200 baud and can be changed with a menu invoked by sending **Control-C** to the UPS. See the following table for pin assignments.

RS-232 Connection (Male)	
Pin 1	Data carrier detected
Pin 2	Received data
Pin 3	Transmitted data
Pin 4	Data terminal ready
Pin 5	Signal ground
Pin 7	Ready to send

Isolated Alarm Relay Interface

The isolated alarm relay interface uses a 15-pin, male, 42D-sub connector.

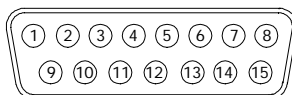


Figure 21. 15-Pin Serial Port

Relay Interface of Powerware 9150		
	Pin No. Connection	System State
Utility Failure	1 - 2 Closed	Line normal
	1 - 3 Closed	Line failure
Low Battery	4 - 5 Closed	Battery normal
	4 - 6 Closed	Battery low
UPS on Bypass	10 - 11 Closed	On UPS
	10 - 12 Closed	On Bypass
UPS On or UPS Alarm	7 - 9 Closed	UPS on
	7 - 8 Closed	UPS alarm
UPS Shutdown (in Battery Mode only)	13 - 15 Closed	UPS shutdown when operating in Battery Mode. UPS can be shut down by sending a hi-level signal (+5V to +15V) to Pin 15(+) and 14(-), or by connecting Pin 15 to Pin 13. This signal must be present for a minimum of 5 seconds.



NOTE The relay contacts are rated for a maximum 1A/30 Vac or 0.2A/60 Vdc. All relay outputs are isolated from the other circuits of the UPS. The relay contacts must not be connected to any utility connected circuits. Reinforced insulation to the utility is required.

Remote Emergency Power-off Input

REPO is used to shut down the UPS from a distance. This feature can be used for shutting down the load and the UPS by thermal relay, for instance in the event of room overtemperature. Remote shutdown wires are connected on connector X2 (see Figure 18 on page 46).

The pins of connector X2 have been connected together. When this connection is open, the logic circuitry completely shuts down the UPS, thus preventing the power from supplying the load.



NOTE In order to restart the UPS, the pins of connector X2 have to be connected, the battery breaker (CB1) must be reset, and the UPS ON/OFF switch must be turned off and then back on. The pins must be shorted in order to keep the UPS running. Maximum resistance is 10 ohm.

CAUTION



The REPO must not be connected to any utility connected circuits. Reinforced insulation to the utility is required. The REPO switch must have a minimum rating of 24 Vdc and 20 mA.

REPO Connections				
	Wire Function	Terminal Position	Terminal Wire Size Rating	Suggested Wire Size
REPO	L1	X2-1	12 - 22 AWG (4 - 0 mm ²)	18 AWG (0.75 mm ²)
	L2	X2-2		

When REPO is initiated, the UPS Alarm indicator blinks and the audible alarm sounds 3 short beeps and 1 long beep.

Efficiency Optimizer Function

This feature can be activated by your service representative. The Efficiency Optimizer function minimizes power loss and reduces power consumption by automatically switching between Bypass and Online Mode according to the utility power condition.

When utility power is constant and free from disturbances, the UPS switches automatically to Bypass Mode for maximum efficiency. The UPS detects all power imperfections instantly and returns to Online Mode when necessary. As a result, the UPS reaches up to 98% average efficiency.



CHAPTER 5

SPECIFICATIONS

Powerware 9150 Technical Specifications

Rated Power	8 kVA, 10 kVA, 12.5 kVA at 0.7 power factor
Technology	Online, double-conversion topology with Static Bypass switch and 3-position Maintenance Bypass switch. Frequency independent operation.
Input Voltage Range	85 - 146 Vac per phase
Input Power Factor	0.95 typical
Input Rated Voltage	100/200, 110/220, 120/240 Vac 180° phase displacement 120/208, 127/220 Vac 120° phase displacement
Input Frequency Range	45 - 65 Hz
Input Rated Frequency	50/60 Hz selectable, auto-configuring
Nominal/Maximum Input	8 kVA 10 kVA 12.5 kVA
Output Voltage	100/200, 110/220, 120/240 Vac 180° phase displacement 120/208, 127/220 Vac 120° phase displacement 50/60 Hz selectable, auto-configuring
Output Voltage Regulation	±2% static ±5% dynamic at 100% load change Response time 1 ms
Output Voltage Distortion	< 2 % THD linear load < 5 % THD non-linear load
Output Frequency	50/60 Hz, selectable or auto-configuring
Output Frequency Regulation	Synchronization to line, ±0.5, ±1.0 or ±2.0 Hz selectable Free-running: ±0.005 Hz Slew rate 1.0, 2.0 or 3.0 Hz/second selectable
Output Overcurrent	>112.5 - 150% for 30 seconds >150% for 0.3 seconds

Powerware 9150 Model Specifications

Model 12.5 kVA					
Input Current	54A	56A	52A	52A	49A
Output Voltage	100/200V	110/220V	120/240V	120/208V	127/220V
Output Current	52A	52A	52A	52A	52A
Output kVA (line-line loads)	10.4	11.4	12.5	10.8	11.4
Output kVA (line-neutral loads)	10.4	11.4	12.5	12.5	13.2
Output kW	7.28	8.75	8.75	8.75	8.75
Output Peak Current	120A	120A	120A	120A	120A
Efficiency	89%	89%	89%	89%	89%
Power Dissipation (BTU/Hr)	3214	3690	3690	3690	3690
DC Voltage (48-Battery)	288V	288V	288V	288V	288V
Model 10 kVA					
Input Current	45A	48A	43A	43A	41A
Output Voltage	100/200V	110/220V	120/240V	120/208V	127/220V
Output Current	41.7A	41.7A	41.7A	41.7A	41.7A
Output kVA (line-line loads)	8.3	9.2	10.0	8.7	9.2
Output kVA (line-neutral loads)	8.3	9.2	10.0	10.0	10.6
Output kW	5.8	7.0	7.0	7.0	7.0
Output Peak Current	120A	120A	120A	120A	120A
Efficiency	89%	89%	89%	89%	89%
Power Dissipation (BTU/Hr)	2445	2950	2950	2950	2950
DC Voltage (32-Battery)	192V	192V	192V	192V	192V
DC Voltage (48-Battery)	288V	288V	288V	288V	288V

Model 8 kVA					
Input Current	39A	40A	36A	36A	35A
Output Voltage	100/200V	110/220V	120/240V	120/208V	127/220V
Output Current	33.3A	33.3A	33.3A	33.3A	33.3A
Output kVA (line-line loads)	6.7	7.3	8.0	6.9	7.3
Output kVA (line-neutral loads)	6.7	7.3	8.0	8.0	8.5
Output kW	4.7	5.6	5.6	5.6	5.6
Output Peak Current	120A	120A	120A	120A	120A
Efficiency	88%	88%	88%	88%	88%
Power Dissipation (BTU/Hr)	2186	2728	2728	2728	2728
DC Voltage (32-Battery)	192V	192V	192V	192V	192V
DC Voltage (48-Battery)	288V	288V	288V	288V	288V

Physical Specifications

UPS	Model 8 kVA	Model 10 kVA	Model 12.5 kVA
Width	15.75" (400 mm)	15.75" (400 mm)	15.75" (400 mm)
Depth*	29.72" (755 mm)	29.72" (755 mm)	29.72" (755 mm)
Height	28.23" (717 mm)	28.23" (717 mm)	28.23" (717 mm)
Weight with 48 Internal Batteries	550 lb (250 kg)	550 lb (250 kg)	550 lb (250 kg)
Weight with 32 Internal Batteries	457 lb (208 kg)	457 lb (208 kg)	NA

*The optional Power Distribution Module adds 5.0" (127 mm) to the UPS depth.

Environmental and Safety Specifications

Ambient Temperature	0°C to + 40°C operating +15°C to +25°C recommended -10°C to +40°C storage with batteries -10°C to +50°C without batteries
Ventilation	Fan cooling, temperature uP monitored
Altitude	3,281 ft (1000 m) operating without derating 41,012 ft (12500 m) during transportation
Humidity	5 - 95% RH, noncondensing
Audible Noise	< 55 dBA at 1 meter distance
Safety	UL 1778, cUL
EMC/RFI	FCC class A
Surges	ANSI/IEEE C62.41-1991

External Battery Cabinet Specifications

	EBC-48	EBC-96
DC-voltage	288V	288V
Batteries	48 x 7 Ah	96 x 7 Ah
Weight	468 lb (213 kg)	765 lb (348 kg)
Width	15.75" (400 mm)	15.75" (400 mm)
Depth	28.94" (735 mm)	28.94" (735 mm)
Height	28.46" (723 mm)	28.46" (723 mm)



CHAPTER 6

TROUBLESHOOTING

The Powerware 9150 is designed for durable, automatic operation and also alerts you whenever potential operating problems may occur. Usually the alarms shown by the control panel do not mean that the output power is affected. Instead, they are preventive alarms intended to alert the user. Use the following troubleshooting chart to determine the UPS alarm condition.

Indicator or Alarm	Possible Cause	Action
ON BATTERY	LED is on. A utility failure has occurred and the UPS is in Battery Mode. The alarm sounds for five seconds when battery operation is initialized and then twice every minute.	None. The alarm resets when the condition becomes inactive.
	LED is blinking. The battery voltage is low and has less than five minutes of backup time left before UPS shutdown.	Prepare your equipment for shutdown. When utility is restored, the UPS restarts automatically, provides power to the load, and charges the battery.
BYPASSED 2 short beeps	The UPS is in Bypass Mode.	None. The alarm resets when the condition becomes inactive. Contact your service representative if the condition persists.
OVERLOAD	LED is on. Power requirements exceed the UPS capacity (greater than 100% of nominal).	Reduce the load. Your UPS continues to operate, but may switch to Bypass Mode if the load increases (112.5 - 150% of nominal for 30 seconds). The alarm resets when the condition becomes inactive.
	LED is blinking. Overload condition caused the UPS to shut down (greater than 150% of nominal for 0.3 seconds).	Reduce the load and restart the UPS. You may need to obtain a larger capacity UPS.
OVERTEMP On or Blinking	One of the main UPS components is too hot or the fan has failed.	Turn the Maintenance Bypass switch to the SERVICE position. Clear vents. Remove any heat sources. Allow the UPS to cool. If the alarm disappears, turn the Maintenance Bypass switch back to the UPS position. Contact your service representative if the condition persists.
	7 short and 3 long UPS beeps indicate the temperature inside the UPS is more than 50 degrees.	
	4 short and 4 long UPS beeps indicate a fan failure.	

Indicator or Alarm	Possible Cause	Action
ALARM On or Blinking	1 short and 4 long beeps indicate a neutral fault.	Input Neutral must be connected. Contact qualified service personnel (such as a licensed electrician).
	10 short and 5 long beeps indicate a neutral fault at startup.	
	7 short and 1 long beep indicates a neutral fault at shutdown.	
ALARM blinking 3 short beeps and 1 long beep.	REPO initiated.	None. The UPS remains off until the REPO switch is turned back on.
	The circuit connected to the REPO connector is open and preventing UPS operation.	Check that the REPO connector is in place and that the circuit connected to it forms a closed loop. Contact your service representative if the condition persists.
ALARM On or Blinking 5 short beeps and 4 long beeps.	Battery failure. Battery voltage dropped too fast and too low after charging.	Verify the battery circuit breaker(s) are turned on. If the condition persists, the batteries may need replacing. Contact your service representative.
ALARM On or Blinking 11 short beeps and 5 long beeps.	Input phase error.	Input phases must be rotated. Contact qualified service personnel (such as a licensed electrician).

Silencing the Alarm

Press the **RESET** pushbutton on the LED panel to silence and reset the alarm.

Service and Support

If you have any questions or problems with your UPS, call for service at one of the following telephone numbers and ask for a UPS technical representative:

In the United States	1-800-365-4892
In Canada	1-800-461-9166
All other countries	1-919-870-3149

Please have the following information ready when you call for service:

- Model number
- Serial number
- Version number (if available)
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

Upgrading

The Powerware 9150 features easy on-site upgrading. The following table shows the available upgrades:

Unit/Batteries	Available Upgrades
8 kVA, 32 internal batteries	10 kVA
8 kVA, 48 internal batteries	10 kVA, 12.5 kVA
10 kVA, 48 internal batteries	12.5 kVA

To order an upgrade or obtain more information contact your local Powerware Corporation representative or call 1-800-365-4892 and ask for Maintenance Contracts.

Powerware 9150 Limited Warranty (US Only)

This limited warranty applies only to units installed in the fifty United States of America. Powerware Corporation warrants the electronics (Unit) to be free from defects in material and workmanship for a period of two years from the Date of Delivery or 30 months from the Date of Manufacture, whichever expires first.

If, in Powerware Corporation's opinion, the Unit fails to meet published specifications due to a defect in material or workmanship covered by this warranty, Powerware Corporation will repair or replace the warranted Unit at no cost to the customer for replacement parts. Labor required to make the repairs or replacement installation and travel costs incurred by Powerware Corporation's representatives are not included under the terms of this limited warranty, except for labor required during the first 90 days after the Date of Delivery. Equipment supplied by Powerware Corporation, but not manufactured by Powerware Corporation, is warranted solely by the manufacturer of such equipment. Powerware Corporation does not warrant equipment not manufactured by Powerware Corporation (including, for example, batteries). Equipment repaired or replaced pursuant to this warranty will be warranted for the unexpired portion of the original warranty subject to all the terms thereof.

This warranty does not apply to any Unit that has been subject to neglect, accident, abuse, misuse, misapplication, incorrect connection or that has been subject to repair or alteration not authorized in writing by Powerware Corporation's personnel. THIS WARRANTY IS THE PURCHASER'S (USER'S) SOLE REMEDY AND IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTY, AND THERE ARE NO OTHER EXPRESSED OR IMPLIED GUARANTEES OR WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE). In no case will Powerware Corporation's liability under this contract exceed the value of the Unit furnished.

Powerware Corporation's obligation under said warranty is conditioned upon receipt of all payments due (including interest charges, if any). During such time Powerware Corporation has not received payment of any amount due in accordance with the contract terms under which the equipment is sold, Powerware Corporation shall have no obligation under said warranty; also during this time, the period of said warranty shall continue to run and the expiration of said warranty shall not be extended upon payment of the overdue amount. These limitations to said warranty apply even in the event that the equipment is sold by Powerware Corporation for resale to the ultimate user.

In no event shall Powerware Corporation be liable for any indirect, incidental, special or consequential damages. Powerware Corporation shall not be responsible for failure to provide service or parts due to causes beyond Powerware Corporation's reasonable control. THIS LIMITED WARRANTY APPLIES ONLY TO THE ORIGINAL PURCHASER OF THE UNIT, IS VOID, AND POWERWARE CORPORATION DISCLAIMS ALL WARRANTY OBLIGATIONS WHATSOEVER, EXPRESSED OR IMPLIED, UNLESS USER RETURNS TO POWERWARE CORPORATION THE INCLUDED WARRANTY VALIDATION CARD WITHIN THIRTY (30) DAYS OF DELIVERY.

Costs for replacement equipment installation, material freight charges, travel expenses and labor of Powerware Corporation's representatives will be borne by the User. Any advice furnished the User before or after delivery in regard to use or application of Powerware Corporation equipment is furnished without charges and on the basis that it represents Powerware Corporation's best judgement under the circumstances. The use of any such advice by the User is solely and entirely at his or her own risk.

