POWERWARE® 5105

User's Guide

450–1500 VA

www.powerware.com

Requesting a Declaration of Conformity

Units that are labeled with a CE mark comply with the following harmonized standards and EU directives:

- Harmonized Standards: EN 50091-1-1 and EN 50091-2
- EU Directives: 73/23/EEC, Council Directive on equipment designed for use within certain voltage limits
  93/68/EEC, Amending Directive 73/23/EEC
  89/336/EEC, Council Directive relating to electromagnetic compatibility
  92/31/EEC, Amending Directive 89/336/EEC relating to EMC

The EC Declaration of Conformity is available upon request for products with a CE mark. For copies of the EC Declaration of Conformity, contact:

Powerware Corporation
Koskelontie 13
FIN-02920 Espoo
Finland
Phone: +358-9-452 661
Fax: +358-9-452 665 68

Class A EMC Statements

FCC Part 15

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 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 own expense.

ICES-003

This Class A Interference Causing Equipment meets all requirements of the Canadian Interference Causing Equipment Regulations ICES-003.

Cet appareil numérique de la classe A respecte toutes les exigences du Reglement sur le matériel brouilleur du Canada.

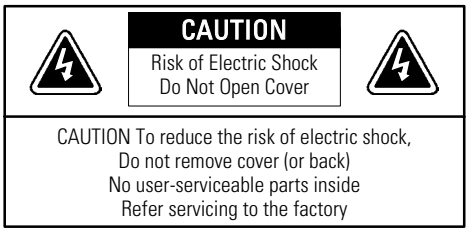
EN50091-2

Some configurations are classified under EN50091-2 as “Class-A UPS for Unrestricted Sales Distribution.” For these configurations, the following applies:

WARNING This is a Class A-UPS Product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take additional measures.

Special Symbols

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



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

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

This symbol indicates that you should not discard the UPS or the UPS batteries in the trash. The UPS may contain sealed, lead-acid batteries. Batteries must be recycled.

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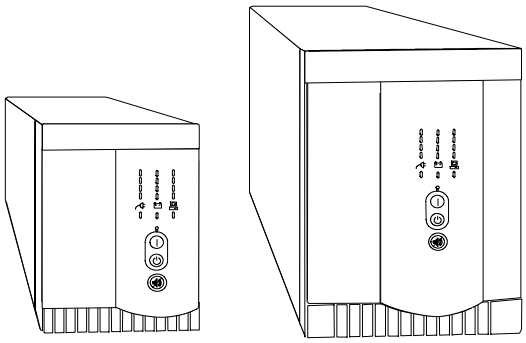
CHAPTER 1

POWERWARE 5105 – ONE OF THE BEST!

The Powerware® 5105 uninterruptible power system (UPS) protects your sensitive electronic equipment from basic power problems such as power failures, power sags, power surges, brownouts, and line noise.

Power outages can occur when you least expect it and power quality can be erratic. These power problems have the potential to corrupt critical data, destroy unsaved work sessions, and damage hardware — causing hours of lost productivity and expensive repairs.

With the Powerware 5105, you can safely eliminate the effects of power disturbances and guard the integrity of your equipment. The Powerware 5105's flexibility to handle an array of network devices makes it the perfect choice to protect your LANs, servers, and workstations.



450–700 VA Models 1000–1500 VA Models

Figure 1. Powerware 5105

Because an integral part of power protection is power management software, the Powerware 5105 comes fully equipped with a communication port, serial cable, and a CD containing both LanSafe III for networked systems and FailSafe III for standalone systems.

Providing outstanding performance and reliability, the Powerware 5105's unique benefits include the following:

- Advanced Battery Management (ABM™) doubles battery service life, optimizes recharge time, and provides a warning up to 60 days before the end of useful battery life.
- Buck and Double Boost regulation ensures consistent voltage to your load by correcting voltage fluctuations without using battery power.
- Sequential shutdown and load management through separate receptacle groups, called load segments.
- Hot-swappable batteries simplify maintenance by allowing you to replace batteries safely without powering down the critical load.
- Network Transient Protector guards your modem, fax machine, and other network communications equipment from surges.
- Start-on-battery capability allows you to power up the UPS even if utility power is not available.
- Optional power communication cards provide enhanced communication capabilities for increased power protection and longer battery backup times.
- The Powerware 5105 is backed by worldwide agency approvals.

CHAPTER 2

INSTALLATION

This section explains:

- Equipment inspection
- Safety precautions
- UPS installation
- UPS rear panels

Inspecting the Equipment

If any equipment has been damaged during shipment, keep the shipping cartons and packing materials for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

To file a claim for shipping damage or concealed damage: 1) File with the carrier within 15 days of receipt of the equipment; 2) Send a copy of the damage claim within 15 days to your service representative.

Safety Precautions

Read the following precautions before you install the UPS.

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.

WARNING

- This UPS contains its own energy source (batteries). The output receptacles may carry live voltage even when the UPS is not connected to an AC supply.
- Do not remove or unplug the input cord when the UPS is turned on. This removes the safety ground from the UPS and the equipment connected to the UPS.
- 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 40°C (104°F). Do not operate near water or excessive humidity (95% max).
- To comply with international standards, the sum of earth leakage current from the load connected to the UPS must not exceed 1.5 mA.

Installing the UPS

The following steps explain how to install the UPS. Figure 2 shows a typical installation only. See "UPS Rear Panels" on page 6 for the rear panel of each model.

NOTE Do not make unauthorized changes to the UPS; otherwise, damage may occur to your equipment and void your warranty.

1. If you are installing power management software, connect your computer to the UPS communication port using the supplied communication cable.

   Some power management software has a Load Segment feature that allows you to control UPS output receptacles. If you plan to use this feature, read the appropriate sections of your power management software manual before you install the UPS.
2. On 230V models, plug the UPS power cord into the input connector on the UPS rear panel.

NOTE
This is a typical setup; your setup may vary.

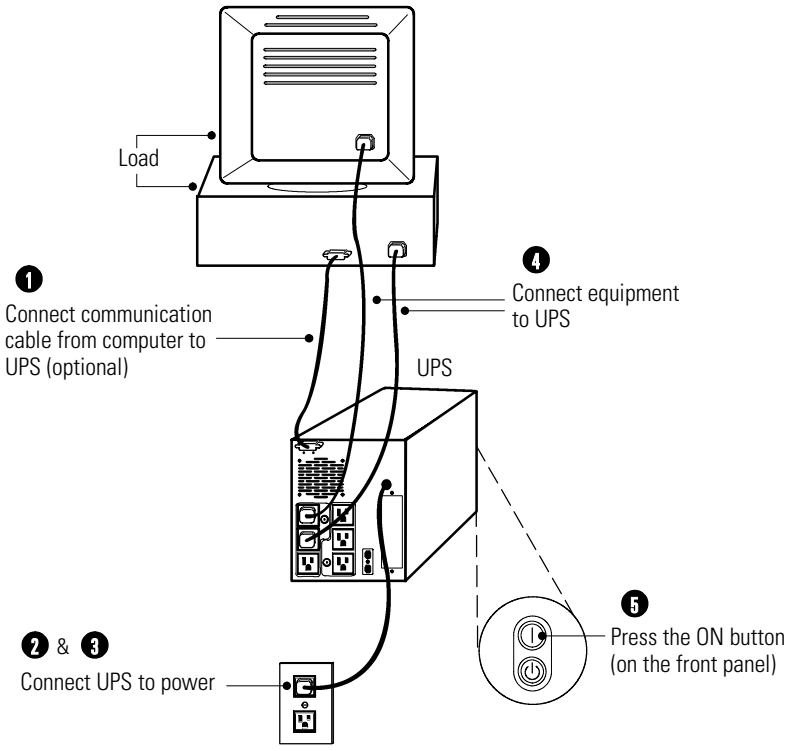


Figure 2. Typical UPS Installation (120V Model Shown)

3. Plug the UPS power cord into a power outlet.

   The UPS conducts a self-test and enters Standby mode. If a red Site Wiring Fault or Battery Service indicator stays on, see Table 10 on page 31.

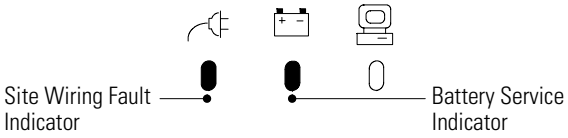


Figure 3. Fault Indicators

NOTE Low voltage models may not recognize 50-Hz outlets. If the UPS does not start when connected to a 50-Hz outlet, unplug the UPS. Press and hold the On | button for 3 seconds to start the UPS on battery and reconfigure the nominal input voltage to 110V (see "Configuration Mode" on page 13). Turn the UPS off. Wait for 30 seconds. Then plug the UPS into the outlet.

4. Plug the equipment to be protected into the UPS output receptacles.

   DO NOT protect laser printers with the UPS because of the exceptionally high power requirements of the heating elements.

5. Start the UPS by pressing the On | button as shown in Figure 2. The Power On indicator illuminates indicating that power is available from the UPS output receptacles.

   The installation is complete. To learn how to operate the UPS, see "Operation" on page 9. To change the factory-set defaults, see "Configuration" on page 13.

NOTE The batteries charge to 90% capacity in approximately 4 hours. However, it is recommended that the batteries charge for 24 hours after installation or long-term storage.

UPS Rear Panels

This section shows the rear panels of the Powerware 5105 models.

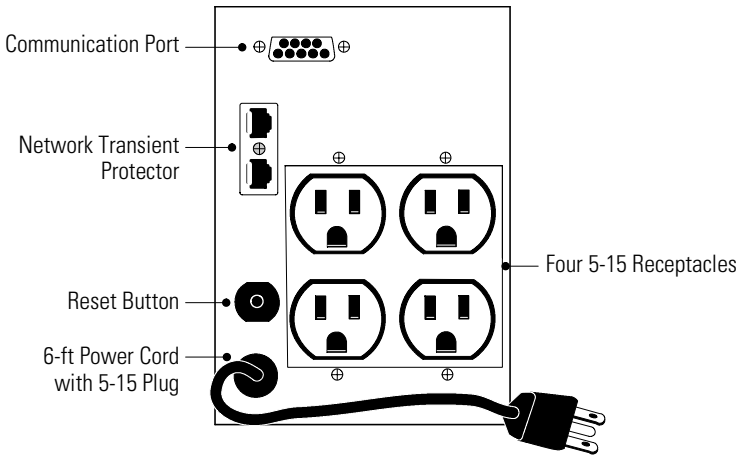


Figure 4. 450–700 VA, 120V Rear Panel

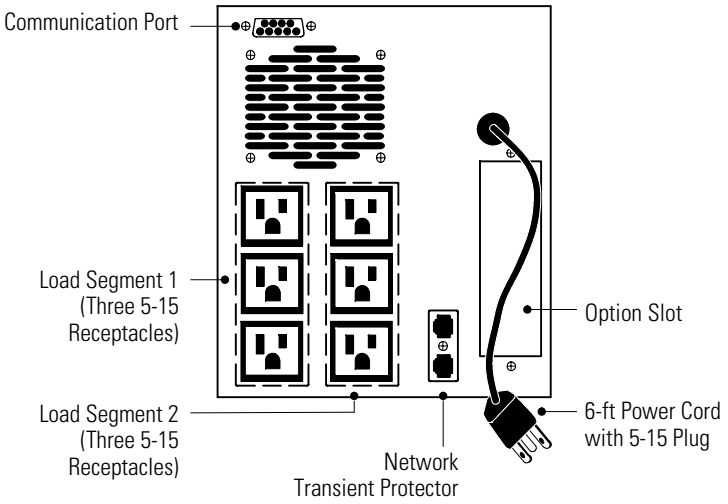


Figure 5. 1000–1500 VA, 120V Rear Panel

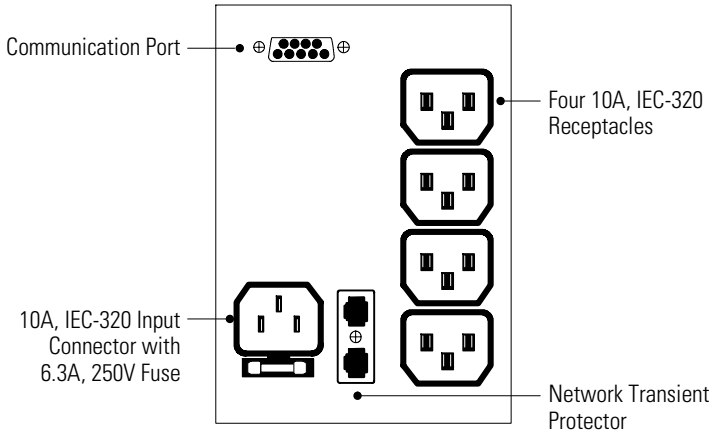


Figure 6. 450–700 VA, 230V Rear Panel

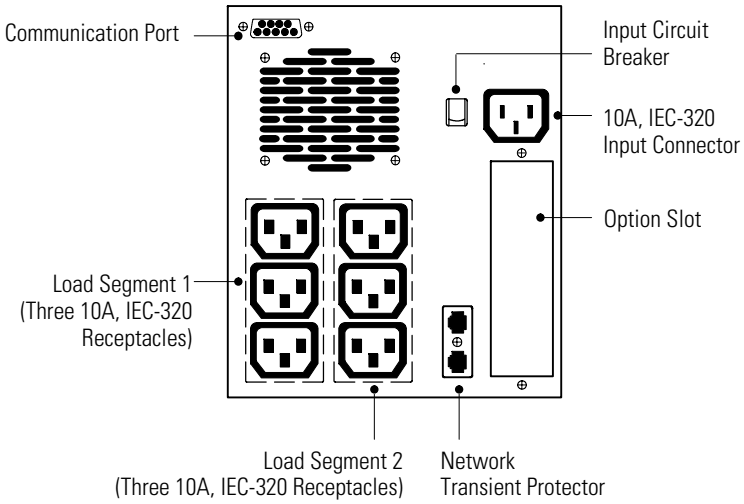


Figure 7. 1000–1500 VA, 230V Rear Panel

CHAPTER 3

OPERATION

This section describes:

- Turning the UPS on and off
- Starting the UPS on battery
- Standby mode
- The UPS front panel and LEDs
- Initiating the self-test

Turning the UPS On

After the UPS is connected to a power outlet, it conducts a self-test and enters Standby mode. To turn on the UPS, press the On | button on the front panel (shown in Figure 8). The Power On indicator illuminates indicating that power is available from the UPS output receptacles.

Starting the UPS on Battery

To turn on the UPS without using utility power, press and hold the On | button for three seconds. When the UPS starts on battery, it does not conduct a self-test to conserve battery power.

Turning the UPS Off

To turn off the UPS, press the Off ⏻ button on the front panel and then unplug the UPS from the power outlet. If you do not unplug the UPS, it remains in Standby mode.

Standby Mode

When the UPS is turned off and plugged into a power outlet, the UPS is in Standby mode. The battery recharges when necessary and the Power On indicator is off, indicating that power is not available from the UPS output receptacles.

UPS Front Panel

The UPS front panel LEDs indicate how the UPS is operating and also alert you of potential power problems. Figure 8 shows the UPS front panel indicators and controls.

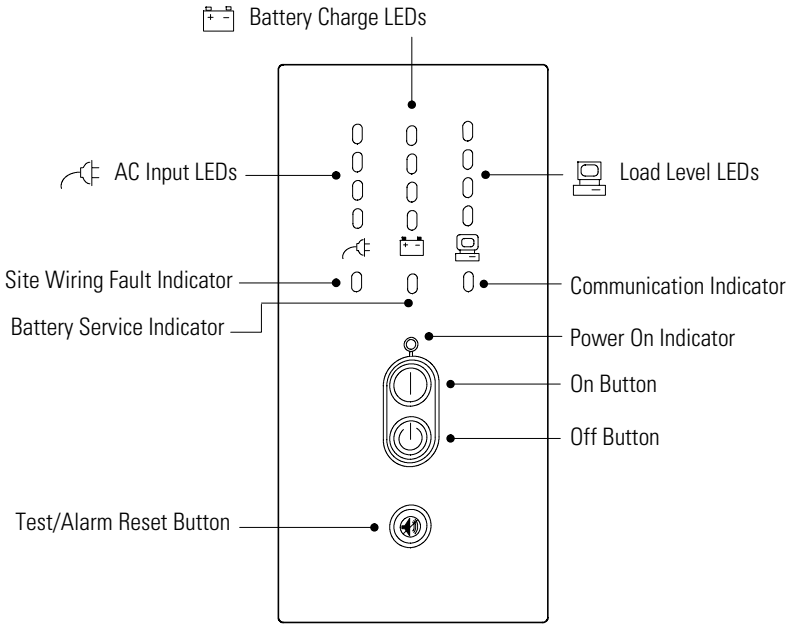


Figure 8. UPS Front Panel

The following sections describe the LED functions during normal operation. If any LEDs are red, see Table 10 on page 31 to identify and correct the problem.

AC Input LEDs

The AC Input LEDs show information about the utility power coming into the UPS (see Figure 9).

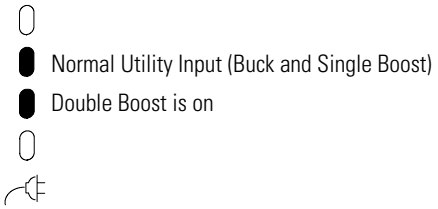


Figure 9. AC Input LEDs (Normal Mode)

The second LED indicates that the UPS is operating normally from utility power. The UPS provides consistent voltage with the Buck and Single Boost feature.

The third LED indicates that the UPS is using the Double Boost feature to automatically correct voltage fluctuations.

If any AC Input LEDs are red, see page 32 for more information.

Battery Charge LEDs

The Battery Charge LEDs show information about the UPS batteries (see Figure 10).

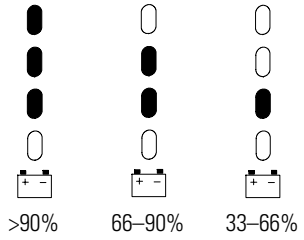


Figure 10. Battery Charge LEDs (Normal Mode)

Each LED represents the approximate percentage of battery charge. When the battery is fully charged (greater than 90%), the top three LEDs illuminate. If the battery capacity is between 66% and 90%, the second and third LEDs illuminate. The third LED illuminates if the battery charge is between 33% and 66%.

If any Battery Charge LEDs are red, see pages 32 and 33 for more information.

Load Level LEDs

The front panel displays the total load current or watts plugged into the UPS (see Figure 11).

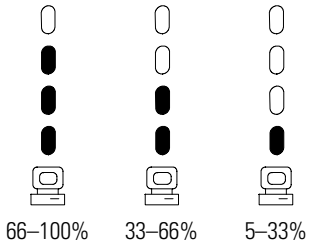


Figure 11. Load Level LEDs (Normal Mode)

Each LED represents 1/3 of a full load rating. When the UPS is approximately fully loaded (66–100%), all three LEDs illuminate. If the load is 33–66% of UPS capacity, the third and fourth LEDs illuminate. The last LED illuminates if the load is between 5% and 33%.

If any Load Level LEDs are red, see page 33 for more information.

Initiating the Self-Test

Press and hold the button for three seconds to initiate the self-test. During the test, individual LEDs illuminate as various parts of the UPS are checked. If the UPS finds a problem, an LED indicates where the problem is. For more information, see “Troubleshooting” on page 31.

NOTE All three Battery Charge LEDs should be lit and the UPS must not be in Battery mode to perform the self-test.

CHAPTER 4

CONFIGURATION

This section explains:

- Why you may want to change factory defaults
- How to reconfigure options

Why Change Factory Defaults?

Nominal Input Voltage

When the utility power consistently fluctuates, the UPS repeatedly corrects the input voltage by switching to battery power when the nominal input range is:

- Higher than +20% of 120V or 230V nominal
- Lower than -30% of 120V or 230V nominal

You can configure the UPS to more closely match the nominal input voltage by selecting a different input voltage or extending the input voltage range. See Table 1 on page 15 for a list of available options.

Other Settings

You can change the UPS default configurations for alarms and shutdown parameters, including: timing for the low battery alarm, the time delay for an unconditional shutdown, alarms for loss of utility power or site fault, and controlling loads that use less than 5% of the current when the UPS is on battery. See Table 1 on page 15 for a list of available options.

Configuration Mode

When the UPS is in Configuration mode, the LEDs represent the configuration options. The control buttons (On | button and button) are used to modify the UPS configuration. Figure 12 shows the LEDs and Table 1 explains the corresponding options.

CAUTION

DO NOT press the Off ⏻ button while the UPS is in Configuration mode; pressing the Off ⏻ button removes all power to your equipment.

1. Press and hold the On | button and the 🔊 button simultaneously for one beep. The UPS switches to Configuration mode.
2. Press the On | button to scroll through the options. Each time you press the button, the UPS beeps. The LED for the selected option blinks (see Figure 12 and Table 1).

   If you press the On | button and nothing happens, the UPS is still in Operation mode. Repeat Step 1 for one beep ONLY to enter Configuration mode, and then perform Step 2.
3. Press the 🔊 button ONCE to toggle the selected option on or off. The Power On indicator corresponds with the current setting.

   Repeat Steps 2 and 3 for each option.
4. Press the On | button and the 🔊 button simultaneously to return to Operation mode at any time. Scrolling past the last LED also returns the UPS to Operation mode.

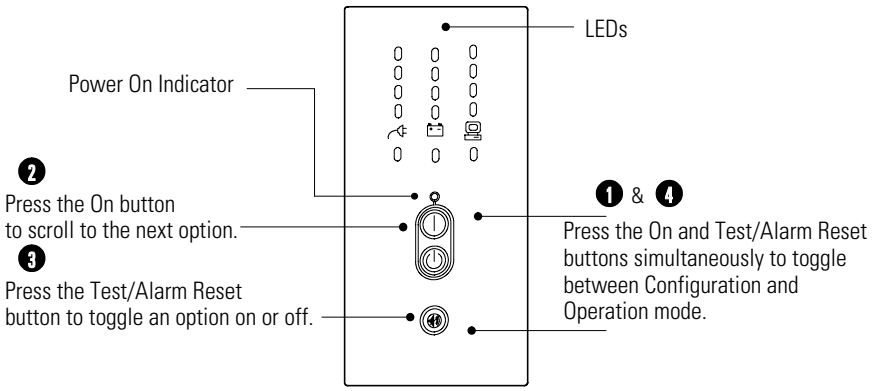
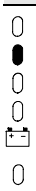
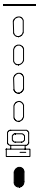


Figure 12. Using the Configuration Mode

Table 1. Configuration Mode LEDs and Options

LED	Option	Power On Indicator	Explanation
● ○ ○ ○ ⚡ ○	120/230V Nominal Input Voltage	ON (default)	Nominal input voltage on low voltage models is 120V and on high voltage models is 230V; all other nominal input voltages are disabled.
		OFF	120/230V is disabled; one of the other input voltage options is selected.
○ ● ○ ○ ⚡ ○	110/220V Nominal Input Voltage	ON	Selecting this option changes the nominal input voltage on low voltage models to 110V and to 220V for high voltage models.
		OFF (default)	110/220V is disabled; one of the other input voltage options is selected.
○ ○ ● ○ ⚡ ○	127/240V Nominal Input Voltage	ON	Selecting this option changes the nominal input voltage on low voltage models to 127V and to 240V for high voltage models.
		OFF (default)	127/240V is disabled; one of the other input voltage options is selected.
○ ○ ○ ● ⚡ ○	120/230V Extended Voltage Mode	ON	The UPS accepts an input voltage within -35% to +20% of 120V or 230V nominal input voltage before switching to battery.
		OFF (default)	The UPS accepts an input voltage within -30% to +20% of 120V or 230V nominal input voltage before switching to battery.
○ ○ ○ ○ ⚡ ●	Site Wiring Fault Alarm	ON (default)	Alarm sounds when the polarity of the outlet is reversed or the ground connection is missing; have a qualified electrician repair the outlet wiring.
		OFF	Alarm DOES NOT sound when the polarity of the outlet is reversed or the ground connection is missing.
● ○ ○ ○ 🔋 ○	Low Battery Alarm	ON (default)	Alarm sounds approximately 3 minutes before battery shutdown.
		OFF	Alarm sounds approximately 5 minutes before battery shutdown.

LED	Option	Power On Indicator	Explanation
	Shutdown Delay	ON (default)	5-second delay before unconditional shutdown after the UPS receives a signal from a computer via the communication port.
		OFF	180-second delay before unconditional shutdown after the UPS receives a signal from a computer via the communication port. When this LED is not enabled, the user can also create a new delay time by reconfiguring the communication port. See "Communication Port Configurations" on page 23 for more information.
	AC Input Failure	ON (default)	Alarm sounds when there is an AC input failure.
		OFF	Alarm DOES NOT sound when there is an AC input failure.
	Sleep Mode	ON (default)	When the UPS is on battery for approximately 5 minutes and the load is drawing less than 5% of the current, the UPS shuts down the load. This feature conserves battery power.
		OFF	Select this option if you want a load less than 5% of the current to be protected by battery power for longer than approximately 5 minutes.
	Reset Defaults	ON (default)	All factory-set defaults are active.
		OFF	One or more factory-set defaults have been changed.

CHAPTER 5

UPS MAINTENANCE

This section explains how to:

- Care for the UPS and batteries
- Replace the batteries
- Test new batteries
- Recycle used batteries

UPS and Battery Care

For the best preventive maintenance, keep the area around the UPS clean and dust-free. If the atmosphere is very dusty, clean the outside of the system with a vacuum cleaner.

For full battery life, keep the UPS at an ambient temperature of 25°C (77°F).

Storing the UPS and Batteries

If you store the UPS for a long period, recharge the battery every 12 months by plugging the UPS into a power outlet. The batteries charge to 90% capacity in approximately 4 hours. However, it is recommended that the batteries charge for 24 hours after long-term storage.

When to Replace Batteries

When the Battery Service indicator illuminates, the batteries may need replacing (see Figure 8 on page 10). Conduct a self-test by pressing the button. If the indicator stays on, contact your service representative to order new batteries.

Replacing Batteries

The hot-swappable battery feature allows you to replace the UPS batteries easily without turning the UPS off or disconnecting the load.

If you prefer to remove input power to change the battery: 1) Press the Off ⏻ button and then unplug the UPS; 2) Wait 60 seconds while the internal processor shuts down before you disconnect the battery.

Consider all warnings, cautions, and notes before replacing batteries.

WARNING

- Batteries can present a risk of electrical shock or burn from high short-circuit current. The following precautions should be observed: 1) Remove watches, rings, or other metal objects; 2) Use tools with insulated handles; 3) Do not lay tools or metal parts on top of batteries.
- ELECTRIC ENERGY HAZARD. Do not attempt to alter any battery wiring or connectors. Attempting to alter wiring can cause injury.

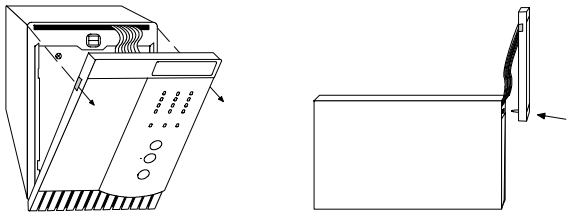
CAUTION

Pull the battery out onto a flat, stable surface. The battery is unsupported when you pull it out of the UPS.

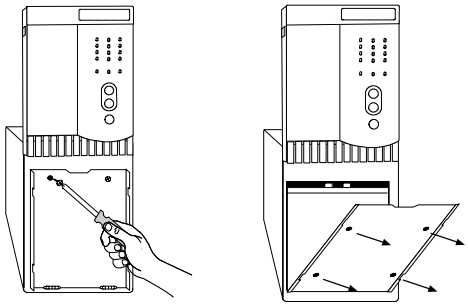
NOTE When the UPS is online, all three Battery Charge LEDs should be lit before hot-swapping the batteries. DO NOT DISCONNECT the batteries while the UPS is in Battery mode.

Use the following steps to replace the batteries:

1. Pull the front panel forward and snap into place as shown.



2. Unscrew the metal battery cover.



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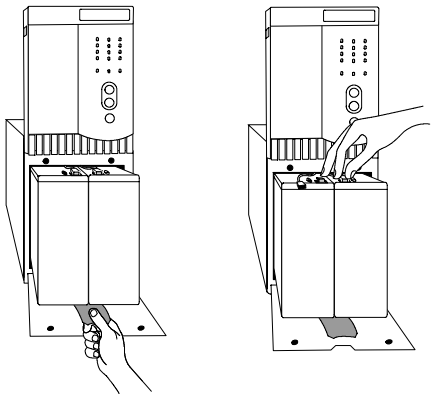
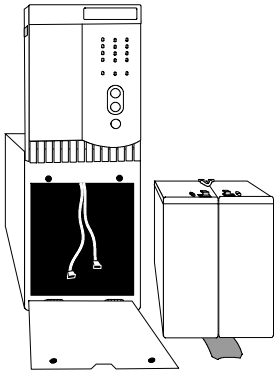
3. Pull the battery out onto a flat, stable surface and disconnect the battery cables to the UPS.



4. Remove the old battery. See “Recycling the Used Battery” on page 22 for proper disposal.



5. Connect the new batteries to the UPS as shown in Figure 13 and reinstall.

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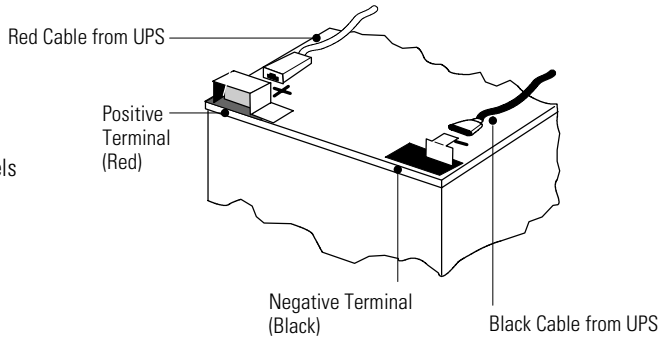
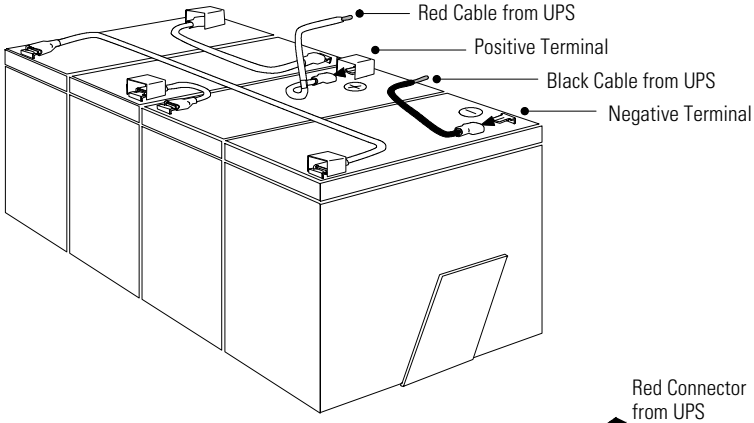


1000 VA Models



1500 VA Models

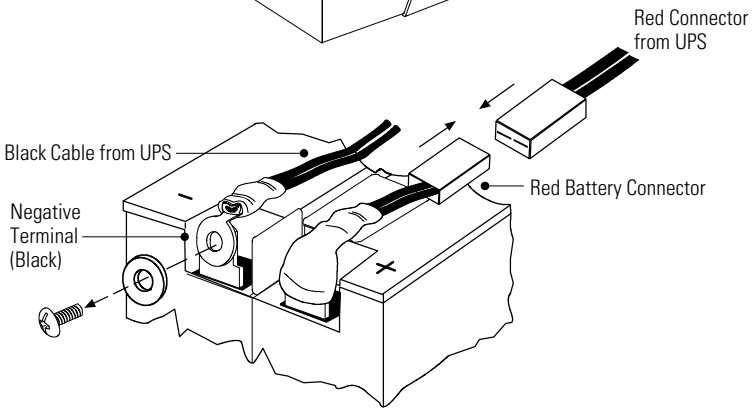


Figure 13. Internal Battery Connections

Testing New Batteries

NOTE It is recommended that the batteries charge for 24 hours before testing.

Press and hold the button for three seconds to initiate a self-test. After the test is finished, the red Battery Service indicator should turn off and the Battery Charge LEDs should show a charge. If the Battery Service indicator stays on, check the battery connections. Call your service representative if the problem persists.

Recycling the Used Battery

Contact your local recycling or hazardous waste center for information on proper disposal of the used battery.

WARNING

- Do not dispose of the battery or batteries in a fire. Batteries may explode. Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
- Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

CAUTION

Do not discard the UPS or the UPS batteries in the trash. This product contains sealed, lead-acid batteries and must be disposed of properly. For more information, contact your local recycling or hazardous waste center.

CHAPTER 6

ADDITIONAL UPS FEATURES

This section describes:

- UPS communication capabilities
- The Network Transient Protector
- Load segments
- Option modules

Communication Port Configurations

To establish communication between the UPS and a computer, connect your computer to the UPS communication port using the supplied communication cable.

CAUTION

To prevent damage to your equipment, connect only a factory-supplied cable or a cable built to factory specifications (see Table 2) to the communication port. A standard serial cable may damage your computer.

When the communication cable is installed, power management software can exchange data with the UPS. The software polls the UPS for detailed information on the status of the power environment. If a power emergency occurs, the software initiates the saving of all data and an orderly shutdown of the equipment.

Communication Indicator

When the UPS receives a command from the computer to establish communication, the Communication indicator on the UPS front panel illuminates (see Figure 8 on page 10). When data is transferring, the Communication indicator flashes.

Pin Out

As shown in Table 2, Pins 1 and 2 operate in two modes: Basic Alarms mode and Serial Data mode. Basic Alarms mode has AC fail alarm and output shutdown. Serial Data mode is UPS Code II compliant.

The system always starts in Basic Alarms mode. When serial data is received at Pin 1, the function of Pin 1 and Pin 2 changes to Serial Data mode.

If serial data has not been received before going to battery power, serial communication is disabled until AC input power returns.

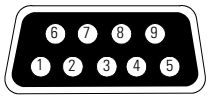


Figure 14. Communication Port

Table 2. Communication Port Pin Assignment

Pin	Signal Type	Function
1	Basic Alarms Mode - Input: RS-232 level high (+12V) pulse 4 to 5 seconds	Remote UPS off. In absence of AC power, output is turned off until normal AC power returns
	Serial Data Mode - Input: RS-232 data	RS-232 serial communication input. 1200 baud, 8 bits, No parity, 1 stop bit, 1 start bit
2	Basic Alarms Mode - Output: RS-232 level high (+12V)	AC Input failure
	Serial Data Mode - Output: RS-232 data	RS-232 serial communication output. 1200 baud, 8 bits, No parity, 1 stop bit, 1 start bit
3	Output: Open collector transistor ON, 50 mA, 40 Vdc rating	AC Input failure
4	Signal Common	Signal Common
5	Output: Open collector transistor ON, 50 mA, 40 Vdc rating	Impending low battery
6	Input: RS-232 RTS	Plug and Play software enable trigger (activates when pin changes from +12V to -12V)
7	Input: Relay contact or RS-232 level	Remote Emergency Power-Off: UPS total output can be kept off with low signal or closing relay contact
8	Output: 8 to 25 Vdc, 5W constant power (0.63A max. @ 8V)	Auxiliary Control Power
9	Chassis	Connection to chassis

Network Transient Protector

The Network Transient Protector, shown in Figure 15, is located on the rear panel and has jacks labeled IN and OUT. This feature accommodates a single RJ-45 (10BaseT) network connector.

Low voltage models can also accommodate an RJ-11 telephone connector that provides protection for modems, fax machines, or other telecommunications equipment. As with most modem equipment, it is not advisable to use this jack in digital PBX (Private Branch Exchange) environments.

Connect the input connector of the equipment you are protecting to the jack labeled IN. Connect the output connector to the jack labeled OUT.

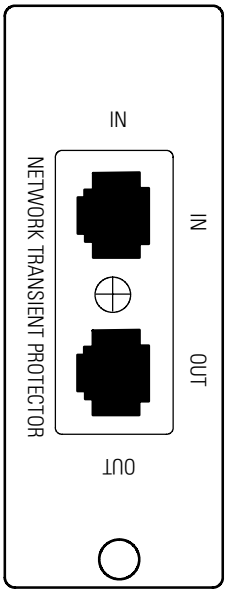


Figure 15. Network Transient Protector

Load Segments (1000–1500 VA Models Only)

Load segments are sets of receptacles that can be turned on individually using power management software. For example, during a power outage, you can keep key pieces of equipment running while you turn off other equipment. This feature allows you to save battery power. See your power management software manual for details.

Option Modules (1000–1500 VA Models Only)

Option modules help your UPS communicate in a variety of networking environments and are installed in the UPS option slot. See the manual that accompanies each module for more information, or contact your sales representative.

CHAPTER 7

SPECIFICATIONS

This section provides the following specifications for the Powerware 5105 models:

- Weights and dimensions
- Electrical input and output
- Environmental and safety
- Indicators and controls
- Battery

Table 3. Model List and Mechanical

	120V Models	230V Models
UPS Models	PW5105 450 PW5105 700 PW5105 1000 PW5105 1500	PW5105 450i PW5105 700i PW5105 1000i PW5105 1500i
UPS Dimensions (WxHxD)	450–700 VA: 4.6" x 6.4" x 14.8" (11.7 x 16.3 x 37.6 cm) 1000–1500 VA: 7.0" x 8.8" x 17.1" (17.8 x 22.3 x 43.4 cm)	
UPS Weight	450 VA: 22 lb (10 kg) 700 VA: 24 lb (11 kg) 1000 VA: 46 lb (21 kg) 1500 VA: 55 lb (25 kg)	

Table 4. Electrical Input

	120V Models	230V Models
Nominal Voltage	120V default; 110, 120, 127V selectable	230V default; 220, 230, 240V selectable
Voltage Range	-30% to +20% at full load for nominal voltage; -35% to +20% user-selectable, extended range	
Nominal Frequency	60 Hz; 50/60 if 110V selected	50/60 Hz
Efficiency (Normal mode)	96%	
Noise Filtering	MOVs and line filter for normal and common mode noise	
Overcurrent Protection	450–700 VA: resettable breaker 1000–1500 VA: no fuse, no breaker	450–700 VA: fuse (6.3A, 250V) 1000–1500 VA: resettable breaker
Connections	6-ft, 5-15P power cord	450–700 VA: 10A, IEC-320 input connector with internal fuse 1000–1500 VA: 10A, IEC-320 input connector

Table 5. Electrical Output

	120V Models	230V Models
Power Levels (rated at nominal inputs)	450 VA, 280W 700 VA, 420W 1000 VA, 670W 1500 VA, 960W	
Regulation (Normal mode)	-10% to +6% of nominal voltage (-15% to +10% using extended range)	
Regulation (Battery mode), Nominal Voltage ±5%	115V for 110, 120, 127V	230V for 220, 230, 240V
Voltage Waveform	Quasi-sine wave	
Overcurrent Protection	Inverter saturation current limited	
Output Receptacles	450–700 VA: (4) 5-15 1000–1500 VA: (6) 5-15	450–700 VA: (4) 10A, IEC-320 1000–1500 VA: (6) 10A, IEC-320

Table 6. Environmental and Safety

	120V Models	230V Models
Operating Temperature	0°C to 40°C (32°F to 104°F); UL tested 25°C (77°F)	
Storage Temperature	-20°C to 60°C (-4°F to 140°F)	
Relative Humidity	5–95% noncondensing	
Operating Altitude	Up to 3,000 meters above sea level	
Audible Noise	Less than 45 dBA typical	
Surge Suppression	ANSI C62.41 Category B (fomerly IEEE 587)	
Safety Conformance	UL 1778; UL 497A; CAN/CSA C22.2, No. 107.1	UL 1778; UL 497A (data line only); CAN/CSA C22.2, No. 107.1; EN 50091-1-1 and IEC 60950
Agency Markings	UL, CSA	UL and CSA (except 1500VA); CE, VDE, NEMKO, FIMKO, DEMKO, SEMKO
EMC	FCC Part 15, ICES-003	EN 50091-2, FCC Part 15, ICES-003

Table 7. Indicators and Controls

Serial Communication	Intelligent serial communication to provide alarms with history, measured parameters, self-test, and many other features; contact your authorized dealer for UPS/computer communication software options
Interface	Ergonomic Indicators: Site Wiring Fault, Battery Service, Communication, Operation, System Normal Bar Graphs: Input Level, Battery Charge Level, Load Level
Contact Closures	AC Input Failure, Low Battery

Table 8. Battery

Configuration	450 VA: (1) 12V, 7 Ah internal battery 700 VA: (1) 12V, 11 Ah internal battery 1000 VA: (4) 6V, 12 Ah internal batteries 1500 VA: (2) 12V, 17 Ah internal batteries
Voltage	450–700 VA: 12 Vdc 1000–1500 VA: 24 Vdc
Type	Sealed, maintenance-free, valve-regulated, lead-acid
Charging	Advanced charging for faster recovery; approximately 4 hours to 90% usable capacity at nominal line and no supplementary power supply load
Monitoring	Advanced monitoring for earlier failure detection and warning

Table 9. Battery Run Times (in Minutes)

	UPS Models by VA Ratings			
Load (VA)	450	700	1000	1500
100	46	63	131	224
250	14	24	37	95
300	11	18	30	75
450	5	12	19	38
600		7	14	30
700		5	11	26
850			8	21
1000			7	16
1250				12
1500				8

NOTE Battery times are approximate and vary depending on the load configuration and battery charge.

CHAPTER 8

TROUBLESHOOTING

This section explains:

- UPS alarms and conditions
- How to silence an alarm
- Service and support

Audible Alarms and UPS Conditions

The UPS has an audible alarm feature to alert you of potential power problems. Use Table 10 to determine and resolve the UPS alarms and conditions.

Silencing an Audible Alarm

To silence the alarm for an existing fault, press the button. If UPS status changes, the alarm beeps, overriding the previous alarm silencing.

Table 10. Troubleshooting Guide

Alarm or Condition	Possible Cause	Action
The Power On indicator is not on; the UPS will not start.	A circuit breaker or an input fuse on the rear panel is open.	Push the circuit breaker button or replace the fuse (see "UPS Rear Panels" on page 6).
	The power cord is not connected.	Check the power cord connections.
	The wall outlet is faulty.	Have a qualified electrician test and repair the outlet.
	The UPS may be unable to recognize a 110V, 50-Hz wall outlet.	See "Specifications" on page 27 to verify that your UPS accepts 110V nominal input. Unplug the UPS. Start the UPS on battery and reconfigure the nominal input voltage for 110V (see "Configuration Mode" on page 13). Turn off the UPS for 30 seconds. Plug the UPS into the outlet.
	A battery fuse or circuit breaker is open.	Contact your service representative.

Alarm or Condition	Possible Cause	Action
The UPS switches frequently between battery and AC input.	Input voltage in your area differs from the UPS nominal.	Change the UPS input voltage to match your local voltage; see "Configuration Mode" on page 13.
The Low Battery Alarm does not give enough warning.	The batteries need charging or service.	Plug the UPS into a power outlet for 24 hours to charge the battery. After charging the battery, press and hold the button for 3 seconds; then check the Battery Service indicator. If the Battery Service indicator is still on, see "UPS Maintenance" on page 17 to replace the battery.
	The Low Battery Alarm is not set appropriately.	Change the alarm setting. See "Configuration Mode" on page 13.
AC input high	The AC input voltage is too high. The UPS is running on battery power.	Correct the input voltage, if possible. The UPS continues to operate on battery until the battery is completely discharged. If the condition persists, the input voltage in your area may differ from the UPS nominal. Change the UPS input voltage to match your local voltage (see "Configuration Mode" on page 13).
AC input low	The line voltage is too low. The UPS is running on battery power.	Correct the input voltage, if possible. The UPS continues to operate on battery until the battery is completely discharged. If the condition persists, the input voltage in your area may differ from the UPS nominal. Change the UPS input voltage to match your local voltage (see "Configuration Mode" on page 13).
Site Wiring Fault	Ground wire connection does not exist or the line and neutral wires are reversed in the wall outlet.	Have a qualified electrician correct the wiring. To disable this alarm, see "Configuration Mode" on page 13.
Low Battery Charge	The battery is running low.	3 to 5 minutes or less of battery power remains (depending on load and battery charge). Prepare for a shutdown. Save your work and turn off your equipment.

Alarm or Condition	Possible Cause	Action
 Battery Service	The battery may be fully discharged because of: • long-term storage • frequent power outages • end of battery life	Plug the UPS into a power outlet for 24 hours to charge the battery. After charging the battery, press and hold the  button for 3 seconds; then check the Battery Service indicator. If the Battery Service indicator is still on, see "UPS Maintenance" on page 17 to replace the battery.
	The battery is not connected correctly.	Check the battery connections. Call your service representative if the problem persists.
 Battery Service	The DC voltage is high; the alarm does not clear.	Contact your service representative.
 Overload	Power requirements exceed UPS capacity or the load is defective.	Remove some of the equipment from the UPS. You may need to obtain a larger capacity UPS.

Service and Support

If you have any questions or problems with the UPS, call your **Local Distributor** or the **Help Desk** 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 the Help Desk:

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

If repair is required, you will be given a Returned Material Authorization (RMA) Number. This number must appear on the outside of the package and on the Bill Of Lading (if applicable). Use the original packaging or request packaging from the Help Desk or distributor. Units damaged in shipment as a result of improper packaging are not covered under warranty. A replacement or repair unit will be shipped, freight prepaid for all warrantied units.

NOTE For critical applications, immediate replacement may be available. Call the **Help Desk** for the dealer or distributor nearest you.