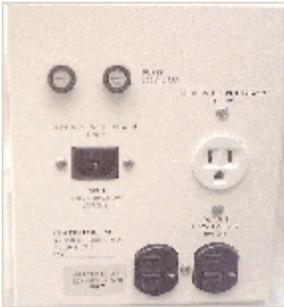




PowerStar Inc. PS-1501VI©
USERS MANUAL Rev3 THE GLUPS Global 240-120 Bivolt UPS



Powerstar Inc. 301-948-0713
9073 Shady Grove Ct.
Gaithersburg Maryland

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The Glups®©



PowerStartm Data Sheet :

GLUPS (GLOBAL UPS) 1500

va UPS

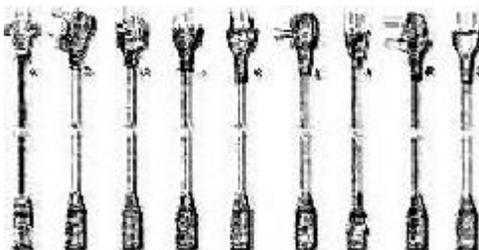
GLUPS PS-1501VI Global Universal Deployable UPS

PowerStar Inc. 9073 Shady Grove Ct. Gaithersburg, Md. 20877

250/110v 47-63hz hz input 110 -120 v 50/60 hz output or 120-110v 50/60hz

SOLVES OVERSEAS POWER AND PRINTER REQUIREMENTS

- 1500 VA UPS, 1500va isotran clearly labeled plugs for US and Oconus
- add a 1000w 120volt laser printer to the UPS and not affect operation
- Allows computers with 50/60hz operation to deploy overseas at 250v-220v
- US, and/or European, Korean, and Middle Eastern, SHUKO plugs
- Intelligent UPS with 10 minute battery backup @90% load
- Now shipping with input circuit breakers
- Isolation Transformer module which easily converts power from 240 to 120, 220 to 110
- Intelligent, modular, ruggedized packaging because we expect to travel
- UPS operates at 50/60 hz
- Weights range from 66 lbs. With galvanic isolation transformer
- UPS shutdown software fo NT, UNIX, HP, SUN, SCO, Novell, Windows etc.(powerchute)
- Switchover time from main power is: 250-1500va 0 to<4ms,
- All metal shell for rugged operation, shielded connectors
- Front panel selftest of UPS, batteries, main board, lights, load, battery level
- Audible adjustable alarm for power outages, with recurring notification
- Batteries are individually tested front server
- Front panel includes load level, status, selftest, on/off, de-energize, cold-start
- Batteries upgradeable to flame retardant batteries
- Dimensions 16x 15.5x7
- Two 18 amp/hour batteries .28 fire retardant hot-swappable
- 5 year warranty -Made in USA, Maryland
- Metal welded frame for universal applications, standard UPS for US applications
- GSA available
- UPS is FCC B listed, Temperature range from 40Degrees F, 110 degrees F w/vent.
- Militarized carrying case available, **International power cords included**



Benefits: These mobile features allow you to deploy sensitive 50/60hz computers at a moments notice, anywhere they are needed in the World, while giving the user the protection of a UPS. Thus the user will gain reliability, flexibility, and availability while management will save on the need for permanent installations.

In the Global environment, the GLUPS is essential.

PowerStar Inc. Mission Critical Power

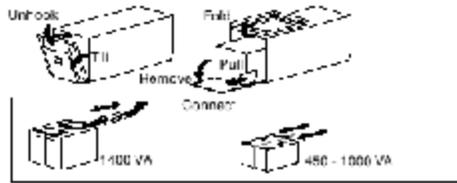
9073 Shady Grove

Gaithersburg Maryland 20877

800-209-5556 301-948-0713

<http://www.powerstarinc.com/power.html>

Smart-UPS (450 through 1400 VA) and
Smart-UPS XLBP



1. Cooling and Fan Operation of -UPS

INFORMATION: All PS-1501vi -UPS , have cooling fans.

Fan cooling runs during four normal, though in most cases infrequent, modes of operation. These modes are listed as follows:

- 1) The fan is on whenever the UPS is operating on-battery.
- 2) The fan is on when the UPS' internal ambient temperature exceeds 60 ! C (140 ! F). When cooled to below 50 ! C (122 ! F), the fan is shut off.
- 3) The fan is on when the output load rises to above 75% of full rated load. When the load is reduced to below 70% of full rated load, the fan is shut off.
- 4) The fan is on when the battery charger is delivering power subsequent to a utility outage.

Note: ps-1501vi -UPS must be allowed 1" (2.5 cm) of clearance on all sides for proper ventilation.

2. Power, Crest, And Surge Factors

Introduction

This Technical Note explains the technical terms of Power Factor, Crest Factor, and Surge Factor. The use of these terms in specifying UPS is explained.

Power factor

Power factor is a quantity which has important implications when sizing a UPS system. Power is a measure of the delivery rate of energy and in DC (direct current) electrical circuits is expressed as the mathematical product of Volts and Amps (Power = Volts x Amps). However, in AC (alternating current) power system, a complication is introduced; namely that some AC current (Amps) may flow into and back out of the load without delivering energy. This current, called reactive or harmonic current, gives rise to an apparent power (Volt x Amps) which is larger than the actual power. This difference between the apparent power and the actual power gives rise to the power factor. The power factor is equal to the ratio of the actual power to the apparent power. The apparent power is expressed as the Volt-Amp or VA rating. Therefore, the actual power in any AC system is the VA rating multiplied by the power factor.

For many types of electrical equipment the difference between apparent power (VA) and actual power (Watts) is very slight and can be ignored, but for virtually all computers the difference is very large and important. In a study done by PC Magazine, it was found that typical computer systems exhibit a power factor of .65 which means that the apparent power (VA) was 50% larger than the actual power (Watts)!

To size a UPS and insure that the UPS output capacity is sufficient, the VA rating of the UPS should be larger than the VA requirement of the load. The power or Watt rating of the load is lower and should not be used because this rating does not include the extra reactive or harmonic current that the UPS will actually be required to supply during service.

Many UPS manufacturers do not include both Watt and VA specifications for their UPS products. When the VA rating of a UPS is not furnished, it can be very difficult to determine if the UPS is capable of supplying a specific load. In fact, many UPS systems which are specified for operation at a specific Watt rating will not actually run rated power if the load is a typical computer system with a .65 power factor! When the Watt rating is the only rating specified for a UPS, we have found that a general rule is to assume that a UPS Watt rating is equal to the VA rating.

Recently, a new type of computer power supply has been developed, called a "power factor corrected power supply". This new type of supply exhibits an input power factor is equal to one. It is likely that an international regulation (called IEC 555) may force most computers to use a power supply of this type at some point in the future. This is specially true for computers with power supplies rated at greater than 500Watts output. However, today power supplies of this type remain rare.

American Power Conversion specifies both the Watt and the VA rating for all UPS products.

For further discussion of the meaning and application of power factor, consult the references at the end of this note.

Crest factor

In addition to a low power factor, computer loads are also unusual in that they exhibit a very high crest factor. Crest factor is the ratio between the instantaneous peak current required by the load and the RMS current (RMS stands for Root Mean Square, which is a type of average). Most common electrical appliances exhibit a crest factor of 1.4 (1.4 is the ratio of the peak value of a sine wave to its RMS value). When a load exhibits a crest factor of more than 1.4, the source (UPS) must supply the peak current desired by the load. If the source does not supply the current, then the source voltage will become deformed (distorted) by the excess peak current. Therefore, if a UPS is not sized to supply the crest factor desired by the load, the output voltage waveform of the UPS will be distorted.

The crest factor requirement of a computer load will vary depending on the source which it is supplied from. The crest factor may even vary when the computer load is moved from one AC receptacle to another in the same room. It is widely believed that the crest factor is an inherent characteristic of a computer load, when in fact crest factor results from an interaction between the load and the AC source. The crest factor required by a computer load depends on the AC source waveform. For a sine wave source, a computer will typically exhibit a crest factor of 2 to 3. For a source waveform which is a stepped approximation to a sine wave, a computer will exhibit a crest factor of 1.4 to 1.9.

It is widely but mistakenly believed that it is desirable to operate a computer at as high a crest factor as possible. In fact, computer manufacturers go to great lengths to reduce the crest factor of the computer because high crest factor causes overheating of power supply components.

The reduction in crest factor which occurs when a computer load is operated from a UPS, surge suppressor, or power conditioner is a positive side benefit, except if the reduction is accompanied by excessive distortion of the input voltage waveform to the computer load. Such distortion may result in a significantly reduced peak voltage being supplied to the load, which is equivalent to a brownout condition. The UPS or line conditioner must be designed to maintain the proper peak voltage.

sine wave UPS systems have a very high crest factor capability of approximately 3 when operated at full load, 4 when operated at 1/2 load, and 8 when operated at 1/4 load. The smaller stepped wave models have a crest factor capability of 1.6 at full load and 2 at 1/2 load. This is much better performance than a typical power conditioner or UPS. PowerStar UPS systems are designed to maintain the proper peak voltage into the computer load for computers with any input crest factor specification.

In all computers tested, it was found that operating the computer from an PowerStar UPS caused the efficiency of the computer power supply to increase by a small but measurable amount, resulting in decreased operating

temperature of the computer.

Surge factor

This term is often mistakenly related to the surge suppression characteristic of a UPS or surge suppressor, which is a different and unrelated characteristic. Surge factor relates to the momentary overload capacity of the UPS and is a measure of the ability of the UPS to start-up loads which temporarily require extra power when they start-up. Examples of loads which have a high surge factor requirement include motors and disk drives.

For typical computer systems with hard disk drives, the surge factor required is approximately 1.15 times the steady-state power consumption. For large systems with disk arrays, the surge factor required can be approximately 1.5 times the steady-state power consumption.

All PowerStar UPS systems have enough surge factor capability to start typical hard disk loads even when the UPS is operated at the full power rating.

3. Information On Internal PS-1501vi Temperature Ratings and Cooling

INFORMATION: The internal temperature of the -UPS can be easily monitored via APC's PowerChute plus software. This temperature value is logged into PowerChute's data log file (PWRCHUTE.DAT) and is also displayed in the main screen of the PowerChute plus Graphical User Interface. The typical accuracy of this measurement is $\pm 5\%$ of the full scale value of 100°C . The temperature rise inside the unit is dependent upon several factors, including both the outside ambient temperature, regardless of whether the unit is on line or on battery, and the load which is applied to the output of the UPS.

The normal operating temperature while the UPS is on line at 25°C ambient is approximately 45°C (113°F). This temperature rise is due to the power dissipation of both the battery charger and the output transformer. In the worst case condition, during battery discharge at high ambient (40°C) and with full computer load, the inside temperature should not exceed 75°C (167°F). All variants of the -UPS 1400, -UPS 2200, -UPS 3000 models contain cooling fans. Fan cooling is on during four normal, albeit infrequent, modes of operation. These modes are listed as follows:

- 1) The fan is on whenever the UPS is operating on battery.
- 2) The fan is on when the UPS' internal ambient temperature exceeds 60°C (140°F). When cooled to below 50°C (122°F), the fan is shut off.
- 3) The fan is on when the output load rises to above 75% of full rated load of the UPS. When the load is reduced to below 70% of full rated load, the fan is shut off.
- 4) The fan is on when the battery charger is delivering power subsequent to a utility outage.

The -UPS will operate within all ratings over an ambient temperature range of 0°C to $+40^{\circ}\text{C}$ (32°F to 104°F).

4. Troubleshooting Guide for -UPS models and the PS-1501VI

TECHNICAL DESCRIPTION: Troubleshooting Guide for -UPS Models PS-1501VI
Problem Probable Cause Solution

1. Trying to plug into European Power? Simple; Plug the shuko , Euro power cord into the Oconus plug, will only fit there. WARNING: Make sure the two prong Euro/Shuko plug has the hot and neutral plugged in correctly with ground as your guide. If you do not, it can send 270 volts through the ups, and cause MPV to blow, which creates smoke, and UPS must be replaced.at your expense.

2. UPS will not turn on

a. UPS test switch is off on front panel switch not pressed

1. a. Press front panel button to power up UPS. **TEST BUTTON**

1 b. UPS's input circuit breaker is tripped, possible overload of UPS.b.

Unplug equipment to reduce load on UPS and reset (depress) circuit breaker. or replace fuse after consulting with electrician .

c. Poor connection of the power cord (mostly upon initial setup).c.

Make sure that the cord is firmly connected at both ends.

d. Problem with utility voltage: voltage is low, high, distorted or outlet is dead.d. Move UPS to a known properly functioning outlet to test. Check outlet with multimeter or have a qualified electrician examine it.

2. UPS operates on battery even though normal voltage is thought to exist.a. UPS's input circuit breaker fuse in oconus is blown or input circuit breaker on ups is blown.a. Unplug equipment to reduce load on UPS and reset (depress) circuit breaker.

b. Chronically high , low, or distorted line voltage.b. Test input voltage with UPS's bar graph by depressing and holding the test button. If voltage is at fringes of transfer spectrum (i.e., for domestic UPSes, the defaults are at approximately 90V or 132V) the UPS is in its hysteresis band and is waiting for the input voltage to move away from these transfer points before coming back on-line. If the power quality is poor due to local cyclic heavy load switching or if unit is running off a generator, desensitize UPS by switching option switch 1 to on position.

3. UPS frequently goes on to battery, more than once or twice an hour.a. Chronically high , low, or distorted line voltage.a. Set Sensitivity option switch 1 and 2 to match input voltage range and desensitize

UPS. If the problem persists, contact a qualified electrician to inspect power quality at outlet.

b. The power quality may be poor due to local cyclic heavy load switching (manufacturing environment, laser printers or photo copiers on same circuit branch) or unit is running off a generator.b. Set option switch 1 and 2 to match input voltage range and desensitize UPS. If the problem persists, contact a qualified electrician to inspect power quality at outlet.

4. UPS does not provide expected backup time.a. Batteries are not fully charged.a. Recharge the batteries for 4 hours and retest.

b. Precalculated load on UPS does not equal actual load.b. Check UPS's output bar graph to check load on unit. Recalculate runtime of UPS and compare to actual runtime. Remove unnecessary loads such as printers to increase runtime.

5. UPS goes to battery, gives high pitched signal , and shuts off.UPS is overloaded.Check UPS's output bar graph to check load on unit. Remove unnecessary loads such as printers.

6. Replace Battery Light is illuminated and on-line light is extinguished. UPS is shut down and battery is discharged due to extended power failure.Normal operation will return when power is restored and battery has charged sufficiently.

7. Replace battery light is illuminated and unit is on-line.Weak battery.Recharge the batteries for 8 hours and retest. If problem persists after charging, the batteries should be replaced.

8. Site wiring light illuminated- UPS operates normally.Building wiring error: UPS detected missing ground, hot-neutral polarity reversal, or overloaded neutral circuit. Potential >5 volts between neutral and ground possibly detected.Have electrician test utility outlet and correct the building wiring.

10. UPS on-line making constant tone.UPS is overloaded.Check UPS's output bar graph to check load on unit. Remove unnecessary loads such as printers.

11. Indicators on front panel flash in a marquee fashion.UPS has been shut down (put to sleep) by UPS monitoring software.UPS will restart when AC power returns.

If after applying the fixes explained above you are still experiencing difficulties with the unit, please search APC's knowledge base <http://www.apcc.com>, for the particular problem, or contact APC technical support at 800-800-4272. Or contact PowerStar Inc. at <http://www.powerstarinc.com>

5. Cooling and Fan Operation of -UPS

TOPIC Operation of -UPS' internal cooling fans, temperature thresholds and conditions for forced ventilation

INFORMATION All -UPS 1400, 2200, 3000, and XL models have cooling fans. Fan cooling runs during four normal, though in most cases infrequent, modes of operation. These modes are listed as follows:

- 1) The fan is on whenever the UPS is operating on-battery.
 - 2) The fan is on when the UPS' internal ambient temperature exceeds 60 ! C (140 ! F). When cooled to below 50 ! C (122 ! F), the fan is shut off.
 - 3) The fan is on when the output load rises to above 75% of full rated load. When the load is reduced to below 70% of full rated load, the fan is shut off.
 - 4) The fan is on when the battery charger is delivering power subsequent to a utility outage.
- Note: -UPS must be allowed 1" (2.5 cm) of clearance on all sides for proper ventilation.

For information on heat dissipation (BTUs), please reference the Knowledge Base document entitled "Thermal Dissipation Ratings for -UPS 3G Models" => [Image].

PS-1501VI

6. General Receptacle Wiring Practices

INFORMATION: This document explains which voltages can be derived at the electrical outlet receptacle from the existing wiring found in common electrical boxes for both residential and commercial applications. This information is applicable to the United States only, although Canadian applications will be similar. The examples provided below are for information only.

Residential Applications:

Generally a 120 / 240 volt, three-wire system is used in residential applications.

- 120 Volt Applications

For 120 volt applications, there should be three wires in the box. The expected color of the wires should be green (the green wire is ground, but it could also be a bare wire rather than green), white (neutral), and black (phase also known as hot). Voltage between the phase and neutral conductors will be 115 volts nominal. When connecting a receptacle (usually a NEMA X5-XX), the ground wire bonds to the green terminal, neutral bonds to the silver terminal, and hot bonds to the copper-colored terminal. A qualified person can change a 120 volt dedicated box to a 240 volt box by connecting the neutral wire to a suitable dual-pole circuit breaker on the opposite phase leg. This conductor shall be wrapped with black tape. A suitable 240 volt receptacle will be installed in the box.

- 240 Volt Applications

If the box is being used for a 240 volt application, there should be three wires in the box. The expected colors of the wires should be green (the green wire is ground, but it could also be a bare wire rather than green) and two black wires (phase conductors). Voltage between the two phase conductors should be 240 Volts. When connecting a receptacle (usually a NEMA X6-XX), the green (or bare) wire bonds to the ground lug and the phase conductors bond to the X and Y lugs (either phase conductor can go to either lug). A qualified person can change a 240 volt box to a 120 volt box by taking one of the phase conductors and connecting it to the neutral bus in the circuit breaker panel. This conductor shall be wrapped with white tape. A suitable 120 volt receptacle will be installed in the box.

Commercial Applications:

Generally a 120 / 208 volt, five wire system derived from a transformer with a wye secondary is used in commercial applications. There are three hot phase conductors (colored red, blue, and yellow), a neutral conductor (colored white), and a ground wire (colored green). Some or all of these wires may show up in the box.

- 120 Volt Applications

For 120 volt applications, any one of the hot phase conductors will be connected to the copper-colored terminal on a suitable NEMA X5-XX receptacle. The neutral conductor will be connected to the silver terminal. The ground wire shall connect to the green terminal.

- 208 Volt Applications

For 208 volt applications, any two of the hot phase conductors will be connected to the X and Y terminals of a suitable NEMA X6-XX receptacle. The ground wire will be connected to the ground lug (colored green).

7. Battery Self-Discharge During Storage on the PS-1501VI

INFORMATION: Question:

What is the shelf life of a UPS when stored in the "off" condition without input power and with no UPS load?

Answer:

The answer is strongly dependent on ambient temperature and is slightly varies depending on the UPS model.

Temperature Effects:

The type of battery used in all UPS products has a "self-discharge" characteristic. This is the amount of charge the battery will naturally lose even if it is not connected to anything. At 20! Celsius, a battery will lose 3% of its capacity per month. However, at 40! Celsius, a battery will lose 10% of its capacity per month.

With -UPS: PS-1501vi

There are two ways to turn off a -UPS. When applicable, if the UPS is switched off by using the rear switch, then the battery discharge is equal to the self-discharge rate. However, if the UPS is switched off with the front panel button, then the self discharge rate at 20! Celsius will increase from the natural 3% to 5% per month. The lost power goes into a small micropower circuit which is needed in order for the UPS to "remember" if it is supposed to restart automatically when the AC power is restored.

However, if the UPS is switched off with the front touch switch, then the self discharge rate at 20! Celsius will increase from the natural 5% to 7% per month. The additional lost power goes into a small micropower circuit which is needed for the UPS to "remember" if it is supposed to restart automatically when the AC power is restored.

Bottom Line:

In general, if a UPS is to be stored for a long period of time, the following procedures are strongly recommended in order to keep the batteries from discharging beyond the safe limit:

- If the ambient temperature during storage is - 15!C to + 30!C (+ 5!F to + 86!F), perform a full recharge cycle at least every 6 months.
- In environments where the ambient temperature is + 30!C to + 45!C (+ 86!F to + 113!F), perform a full recharge cycle at least every 3 months.

8. UPS Safety Information A must read

Introduction

This document provides guidance regarding potential safety hazards of ps-1501 UPS systems. A UPS is electrical equipment and contains the same materials and construction details as typical office equipment or home appliances. In addition, the UPS has an internal battery which is an energy source and contains hazardous substances. This document is applicable to any self contained UPS, regardless of manufacturer. In addition, this unit has a stepdown transformer which allows 220v 50hz power to be output at 120v 50hz.

Important: The top connectors are OCONUS and the bottom connectors are CONUS and output. This unit will only output 110-132v 50/60 hz. Any attempt to use other voltages will damage equipment and VOID the warranty.

Organization

This document is organized by situation. The potential hazards corresponding with the situation are identified. Appropriate and inappropriate corrective actions are described.

Access to internal circuitry

UPS systems have no user serviceable parts, other than those indicated as user replaceable modules. UPS systems have internal power sources and can present a hazard to untrained service persons. Refer all servicing to trained personnel.

Smashed, pierced, or damaged enclosure

The cabinet of the UPS is damaged by dropping, piercing, crushing, etc.

Hazard #1: The UPS has an internal energy source, the battery, and represents a potential shock or energy hazard. Action: Shut off circuit breaker feeding UPS or detach input cord from wall receptacle. Turn off any front or rear panel main power switches on the UPS. If the UPS has user-changeable batteries, inspect for damage and disconnect and/or remove them if undamaged. Do not ship unit without disconnecting the battery.

Hazard #2: The UPS batteries contain liquid acid that may be released. Note: the quantity of liquid in a UPS battery is small and is held in absorber pads, but liquid may be squeezed out when the battery is damaged. Action: Inspect for battery case damage or presence of liquid. Assume any liquid seen is highly acidic. Carefully clean up using damp disposable towels, avoid contact with skin. After removing liquid, clean affected surfaces with baking soda and water to neutralize and remaining acidity.

UPS consumed in local fire

A fire at the UPS installation or storage site burns the UPS.

Hazard #1: Materials within the UPS are burned and the combustion products are released. A UPS may contain many types of plastic, which will be the primary source for combustion products. Plastic types include Polycarbonate, PVC, Polypropylene. Printed circuit boards also contain epoxy resin. Action: assume the combustion products of plastics are present during firefighting.

Hazard #2: The UPS continues to supply electrical power during firefighting. Potential shock hazard for firefighters. Action: Trigger site's Emergency Power Off switch if available. Fight fire assuming that it is a live electrical fire.

UPS emits smoke or fumes

An internal malfunction or failure causes the UPS to emit smoke or fumes.

Hazard #1: An electrical short-circuit or overload causes an internal component to burn out. Component makes acrid smell and/or smoke. Most likely sources include A) Epoxy from PCB or components, B) Varnish from transformers, or C) PVC plastic from wires. Action: Unplug unit. Turn off using front or rear panel switches. Ventilate area. If combustion is sustained, disconnect battery if possible. Use dry chemical fire extinguishers, if necessary.

Hazard #2: An internal battery fault or battery charger failure causes the battery to vent fumes. "Metallic" taste in the air or "rotten eggs" smell. Possible agents released include Hydrogen Sulphide (rotten eggs smell), Hydrogen (metallic air taste), and Oxygen. May cause eye or throat irritation, or in severe cases, nausea. Action: Unplug unit and turn off to stop the fumes. Evacuate area. Vent area. No medical attention required for persons exposed. Note: absence of smell indicates release agents are gone; no further action required.

Telephone/Fax Numbers For APC's European Technical Support

INFORMATION: Main Technical Support Lines: Voice+353 91 702020
Fax+353 91 755275

Toll Free Support Phone Numbers: Ireland1 800 702000 x 2045

Austria0660 6480
Belgium0800 15063
Denmark800 18 153
France0800 906 483
Finland9800 13 374
Germany0130 818907
Holland0602 24655
Hungary00800 12221
Israel177 353 2206
Italy1678 74731
Norway800 11 632
Poland00800 353 1202
Portugal050 553182
Russia007 095 2306297
South Africa0800 994206
Spain900 95 35 33
Sweden020 795 419
Switzerland1556 177
Turkey0800 35390275
United Kingdom0800 132990

Backpanel Instructions for the PS1501VI GLUPS (Global UPS)

1. Input circuit breaker

2. European Input 3. Output to UPS 4. Output to printer and scanner

1. Input circuit breakers- These protect the user. The fuses are set and wired to protect the input current at 220v 50hz in put range. .

2. European or OCONUS input. This plug is set for 220v, 50 hz input using the supplied Euro cord. The input is then connected internally to the stepdown transformer which, correctly plugged in, converts the power down to 120v 50 hz power. This power is sent out the output plug (3), which is attached to the UPS. This theory of operation, prevents humans from throwing the wrong switch. It should be soldier proof for many hours of successful operation. Do not plug 60 hz power into this socket. The warranty would be seriously voided.

3. Output to UPS- This plug receives the input voltage, and then sends it along to the power plug of the UPS. Please plug the power cord of the UPS into this socket, when you want to run in Europe i.e. 220v 50 hz operation. The UPS will then receive 120v 50 hz pure power, and the output plugs on the UPS will output 50hz 120 volt protected power.

Please refer to the UPS instructions for the power cord and output selections available to you.

Technical support is always available at Powerstar. In the US call 800-209-5556. International calls can be made to 301-948-0713. Fax to 301-948-2094. Email to : jcarr@powerstarinc.com

home page <http://www.powerstarinc.com>

OCONUS COUNTRY CORDS

DATA SHEET ps1501vi FOR
 TRANSFORMER # 6575
 POWERSTAR INC.002-1011

LEADS	SCHEMATIC		LEADS
S#14/10" 0V	BLUE	WHI	S#12/10"
S#14/10" 240V	BROWN	BLA	S#12/10"

$V = 1.25.9V \text{ RMS}$
 $I = 20' \quad 1500VA$

PRIMARIES ARE INSIDE A SLEEVE.
 LEADS: S=Multistranded wire. Length tolerance: +/- 1/2".
 Manufacturing tolerance is +/- 3%.

NOMINAL SUPPLY: 220-240V +/-10%
 RATED PRIMARY CURRENT: 7.2/6.6A
 RATED FREQUENCY: 50/60 Hz
 TEMP. RISE AT RATED LOAD: 65 °C

DIMENSIONS/WEIGHT:	MOUNTING:	CORE DATA:
OD = MAX. 6.25"	POTTED CENTER	CORE # 900693
H = MAX. 5.0"	CONCAVE BOTTOM	CORE LOSS = 6.4 W
WEIGHT = 22 LBS.	HOLE DIAMETER = 0.50"	NO-LOAD CURRENT = 66 mA

Dimensions stated above do not include leads exit bulge.

OTHER SPECIFICATIONS: Transformer meets UL 1411 and VDE 0550 standards. Transformer label to be serialized.

Label: Transformer # 6575
 POWERSTAR INC.
 (Serial number xxxx)
 (date code)

SPEC DATE: 11/01/12
 By: (Logo)

11. Power, Crest, And Surge Factors

Introduction

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Power factor

Power factor is a quantity which has important implications when sizing a UPS system. Power is a measure of the delivery rate of energy and in DC (direct current) electrical circuits is expressed as the mathematical product of Volts and Amps (Power = Volts x Amps). However, in AC (alternating current) power system, a complication is introduced; namely that some AC current (Amps) may flow into and back out of the load without delivering energy. This current, called reactive or harmonic current, gives rise to an apparent power (Volt x Amps) which is larger than the actual power. This difference between the apparent power and the actual power gives rise to the power factor. The power factor is equal to the ratio of the actual power to the apparent power. The apparent power is expressed as the Volt-Amp or VA rating. Therefore, the actual power in any AC system is the VA rating multiplied by the power factor.

For many types of electrical equipment the difference between apparent power (VA) and actual power (Watts) is very slight and can be ignored, but for virtually all computers the difference is very large and important. In a study done by PC Magazine, it was found that typical computer systems exhibit a power factor of .65 which means that the apparent power (VA) was 50% larger than the actual power (Watts)!

To size a UPS and insure that the UPS output capacity is sufficient, the VA rating of the UPS should be larger than the VA requirement of the load. The power or Watt rating of the load is lower and should not be used because this rating does not include the extra reactive or harmonic current that the UPS will actually be required to supply during service.

Many UPS manufacturers do not include both Watt and VA specifications for their UPS products. When the VA rating of a UPS is not furnished, it can be very difficult to determine if the UPS is capable of supplying a specific load. In fact, many UPS systems which are specified for operation at a specific Watt rating will not actually run rated power if the load is a typical computer system with a .65 power factor! When the Watt rating is the only rating specified for a UPS, we have found that a general rule is to assume that a UPS Watt rating is equal to the VA rating.

Recently, a new type of computer power supply has been developed, called a "power factor corrected power supply". This new type of supply exhibits an input power factor is equal to one. It is likely that an international regulation (called IEC 555) may force most computers to use a power supply of this type at some point in the future. This is specially true for computers with power supplies rated at greater than 500Watts output. However, today power supplies of this type remain rare.

We specify both the Watt and the VA rating for all UPS products. The ps1501vi has a 1000w capability and the isotran is 1575watts and va. So the total on all plugs including the oconus surge plugs is about 1800watts not counting the ups.

For further discussion of the meaning and application of power factor, consult the references at the end of this note.

Crest factor

In addition to a low power factor, computer loads are also unusual in that they exhibit a very high crest factor. Crest factor is the ratio between the instantaneous peak current required by the load and the RMS current (RMS stands for Root Mean Square, which is a type of average). Most common electrical appliances exhibit a crest factor of 1.4 (1.4 is the ratio of the peak value of a sine wave to its RMS value). When a load exhibits a crest factor of more than

1.4, the source (UPS) must supply the peak current desired by the load. If the source does not supply the current, then the source voltage will become deformed (distorted) by the excess peak current. Therefore, if a UPS is not sized to supply the crest factor desired by the load, the output voltage waveform of the UPS will be distorted.

The crest factor requirement of a computer load will vary depending on the source which it is supplied from. The crest factor may even vary when the computer load is moved from one AC receptacle to another in the same room. It is widely believed that the crest factor is an inherent characteristic of a computer load, when in fact crest factor results from an interaction between the load and the AC source. The crest factor required by a computer load depends on the AC source waveform. For a sine wave source, a computer will typically exhibit a crest factor of 2 to 3. For a source waveform which is a stepped approximation to a sine wave, a computer will exhibit a crest factor of 1.4 to 1.9.

It is widely but mistakenly believed that it is desirable to operate a computer at as high a crest factor as possible. In fact, computer manufacturers go to great lengths to reduce the crest factor of the computer because high crest factor causes overheating of power supply components.

The reduction in crest factor which occurs when a computer load is operated from a UPS, surge suppressor, or power conditioner is a positive side benefit, except if the reduction is accompanied by excessive distortion of the input voltage waveform to the computer load. Such distortion may result in a significantly reduced peak voltage being supplied to the load, which is equivalent to a brownout condition. The UPS or line conditioner must be designed to maintain the proper peak voltage.

sine wave UPS systems have a very high crest factor capability of approximately 3 when operated at full load, 4 when operated at 1/2 load, and 8 when operated at 1/4 load. The smaller stepped wave models have a crest factor capability of 1.6 at full load and 2 at 1/2 load. This is much better performance than a typical power conditioner or UPS. PowerStar UPS systems are designed to maintain the proper peak voltage into the computer load for computers with any input crest factor specification.

In all computers tested, it was found that operating the computer from an PowerStar UPS caused the efficiency of the computer power supply to increase by a small but measurable amount, resulting in decreased operating temperature of the computer.

Surge factor

This term is often mistakenly related to the surge suppression characteristic of a UPS or surge suppressor, which is a different and unrelated characteristic. Surge factor relates to the momentary overload capacity of the UPS and is a measure of the ability of the UPS to start-up loads which temporarily require extra power when they start-up. Examples of loads which have a high surge factor requirement include motors and disk drives.

For typical computer systems with hard disk drives, the surge factor required is approximately 1.15 times the steady-state power consumption. For large systems with disk arrays, the surge factor required can be approximately 1.5 times the steady-state power consumption.

All PowerStar UPS systems have enough surge factor capability to start typical hard disk loads even when the UPS is operated at the full power rating.

11. Computer Interface Port Specifications for the PS-1501vi Smart-UPS family

INFORMATION: The computer interface port in the third Generation Smart-UPS has the following characteristics:

- 1) Pins 3, 5, and 6 are open collector outputs which must be pulled up to a common referenced supply no greater than +40 Vdc. The transistors are capable of a maximum non-inductive load of 25 mAdc. Use only pin 4 as the common.
- 2) Pin 2 generates a low to high transition at RS-232 levels when the UPS signals that it is on-battery. Pin 2 is also the RS-232 data output (TXD).
- 3) The UPS will shut down when a high RS-232 level is sustained on pin 1 for 4.5 seconds. The UPS responds to this signal only after a delay and during a power utility failure (when the UPS is operating on battery). Pin 1 is also the RS-232 data input (RXD).
- 4) Apply a momentary (approximately 1 second) high RS-232 level to pin 7 to turn on the UPS and any attached loads. A momentary low turns off the UPS and its load. Pin 7 should be unconnected normally.
- 5) DC operating voltage is available at pin 8.

12. Placing a Ps-1501vi SmartUPS in sleep mode without Powerchute PLUS

TECHNICAL DESCRIPTION: In order to conserve battery charge during a power outage, a SmartUPS have the ability to be placed in sleep mode. Sleep mode refers to a state in which the UPS shuts down while on battery and ceases to power its outlets. When power is restored, the UPS/Power Array wakes. At this time, the unit begins to supply power to the connected equipment and charge its battery.

In most cases, customers utilize this function in combination with APC's Powerchute PLUS software for their server's operating system. However, it is NOT necessary to make a serial connection to place one of the above products in sleep mode. This means that no matter what type of load the units are supporting, the UPS/Power Array can be put to sleep.

By utilizing a ShareUPS or SmartSlot Interface Expander, a Symmetra, Matrix, and SmartUPS can be put to sleep. Using the appropriate dip switches on either accessory, one can configure them for Timer Shutdown Mode. There are several fixed timer values on both accessories. The dip switches on these two accessories differ. See their respective User Manuals to select the Shutdown Mode.

In Timer Shutdown Mode, the ShareUPS or Interface Expander allows the UPS/Power Array to operate on battery for a user-specified length of time before going to sleep. Once the UPS/Power Array transfers to battery, the timer begins counting down like a stopwatch. If power returns, the countdown stops. If the timer runs down, then the accessory sends a signal to the UPS/Power Array. Once the signal is received, an internal timer within the UPS/Power Array starts. Using the low battery signal time value of the UPS/Power Array, another countdown begins. By default, the low battery signal time is 2 minutes. See UPS/Power Array User Manual to change this value. When this amount of time runs down, the UPS/Power Array goes to sleep.

12. Maintenance And Troubleshooting the UPS

Addendum 2001--For qualified Technicians only-Confidential to US government and Powerstar Inc.

1.1 UPS Modification of parameters: Flexability Bultin

The Ps1501vi, Ps700vi, PS6000, PS6002, and PS6003 and stainless steel version UPS are microprocessor controlled and is capable of RS-232 communications through a computer interface port at its rear panel. When combined with power management software and a serial communications interface cable, the PS6000 ups allows flexibility in controlling UPS operation via computer. Using power management software, the user may customize automatic battery test intervals, upper and lower transfer voltage, utility failure sensitivity, output voltage (220/230/240 Vac units only), low battery warning intervals, audible alarm delays, shut down delays, turn on delays and battery capacity dependent restart settings. In addition, the UPS's readiness to supply power during a utility failure may be determined. Power management software can monitor the UPS's battery voltage, available battery capacity and available run time (in minutes) as well as power quality related parameters such as line voltage, line frequency, output voltage and output load.

APC software is utilized by the PS6000 it offers a full range of power management software for use with all members of the PS6000 -ups family. Updates are available .
2.1 Battery replacement indicator and battery tester

The PS6000 -ups provides an indication when the battery needs to be replaced. It gives an indication of the battery's ability to provide sufficient energy during failed utility conditions.

Every UPS is likely to require a battery replacement during its service life. The PS6000 ups systems indicate the need for battery replacement before it is discovered that the UPS fails to provide the expected run time during a power failure.

The PS6000 Smart-ups's replace battery LED indicator shows the result of an actual load test on the battery. By exercising the UPS's battery during the self-test routine, the PS6000 Smart-ups is able to detect a weak battery before it is required to support the load. In applications where the PS6000 Smart-ups is not turned on and off frequently or where the UPS is left operating unattended, the UPS can automatically conduct this self test every 14 days. Power management software can also warn of replace battery conditions and can be used to defeat the automatic self test or reduce the test interval to 7 days.

The on-line indicator lights when the UPS is supplying utility power to the loads. The on-battery indicator comes on when the UPS is supplying battery power. The replace battery indicator lights when the UPS's battery can no longer provide approximately 60% of its rated run time. The overload indicator lights when the loads connected to the UPS exceed the UPS's power capacity. The SmartBoost and SmartTrim indicators light when the UPS is correcting either a low or high utility voltage.

2.2 Diagnostic features

On startup, the UPS by default performs a self-test routine that verifies its readiness to supply power derived from the battery during a utility failure. Diagnosis of line voltage levels can be achieved by using a feature in which the front panel display is transformed into a utility voltage meter. The PS6000 Smart-ups becomes a complete power quality logger and analyzer when used in conjunction with power management software. On 120 Vac models only, the PS6000 Smart-ups.



2.3 Available run time calculation

The PS6000 Smart-ups's available run time in minutes may be monitored using power management software. The available run time changes with respect to the UPS's available battery capacity and output load. In addition, the PS6000 Smart-ups keeps track of changing battery performance and adjusts the available run time indicated for a weak battery nearing the end of its service life. When operating on-battery, the available run time is decremented as the battery capacity is exhausted. This valuable information allows a user to decide when to save files and gracefully close operations. PS6000 Smart-ups also provides an indication of expected run time when the UPS is operating on-line.



2.4 Configurable low battery, shut down, and restart intervals

Because shut down and file saving routines can take longer than the default 2 minute low battery warning interval, the PS6000 Smart-ups offers a choice of extended intervals up to 10 minutes via power management software and the rear panel sensitivity switch.

Many computer networks that issue UPS shutdown commands are unable to do so as the last part of a shutdown routine. In these cases, it is up to the UPS to provide some delay before actual shut down to allow the network to finish the shutdown routine. The PS6000 Smart-ups's shut down delay in response to a shutdown command can be extended from 20 seconds to as long as 10 minutes using power management software.



Table 2.5 Battery Ratings (UPS)

Model (all voltages)	Quantity	Voltage (each)	Amp Hour Capacity (each)		Nominal System Voltage		
6000	5000	2			2	12	17
				24			
6000			4		12	7	24
6002				48	4	12	17
6002RM			4		12	17	48
6002RM3U			8		12	7	48
6002XL			4		12	17	48
6002RMXL			4	12		17	48
6003			4	12		17	

3.1.2 Battery Charging

The battery voltage is maintained at a constant "float" level for maximum battery life and minimal heat dissipation. The UPS's battery charger operates continuously whenever the UPS is plugged in (inverter always on) and the utility voltage is within normal limits. The time required to recharge the batteries to 90% of their full capacity following complete discharge of the UPS into a load 50% of rated capacity is typically within 2-4 hours.

3.1.3 Low Battery Warning

The UPS provides a low battery warning communicated by one or more (A RED LIGHT AT THE LOWER RIGHT HANBD SIDE.LED indicator(s), an audible alarm and by the activation of a signal at the computer interface port and accessory slot prior to shut down due to battery capacity exhaustion. The interval between operation of the low battery warning and shut down of the UPS is minimum of 2 minutes. The warning interval may be set using power management software or accessories to occur at 2, 5, 7 or 10 minutes before shut down. Note that depending on the warning interval selected and other factors such as load applied, all the LEDs in the battery charge bar graph may blink indicating the low battery warning

6. Indicators and Controls

6.1 Visual Indicators

6.1.1 On-Line LED Indicator

The green on-line LED indicates that the UPS is supplying utility power to the loads.

6.1.2 On-Battery LED Indicator

The yellow on-battery LED indicates that the UPS is providing battery power to the loads.

6.1.3 Replace Battery LED Indicator

The red replace battery LED indicates that the battery may no longer be useful and should be checked.

6.1.4 SmartBoost Indicator

The SmartBoost LED indicates that the UPS is correcting a low utility voltage condition. The loads receive normal power.

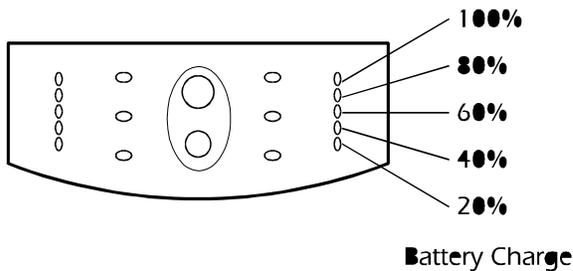
6.1.5 SmartTrim Indicator

The SmartTrim LED indicates that the UPS is correcting a high utility voltage condition. The loads receive normal power.

6.1.6 Overload Indicator

The red overload LED indicates that the loads connected to the UPS exceed the UPS's capacity.

6.1.7 Battery Charge Indicators



The battery charge bar graph display consists of five green LEDs that show the present battery charge as a percentage of battery capacity. Since the capacity is proportional to run time for a given load, the LEDs illuminate proportional to the remaining available run time. When these LEDs flash the battery capacity is low and can supply less than two minutes (default) of run time for the load.

6.1.8 Utility Voltage Indicators

The PS6000 Smart-ups incorporates a utility voltage bar graph display that is accessed by pressing and holding the on/test button while the UPS is on-line (note that this will initiate a self test). The LED indicators illuminate at the thresholds shown in the following table. The top line of the chart represents the top LED in the battery charge bar graph and the bottom line represents the bottom LED.

settings in the UPS, and do individual battery tests. Battery warranty from our OEM supplier is two years. If a technician is in a remote location APC, can swap batteries by knowing the serial number on the back. Battery swaps are at 18008004apc. Also, tech support is always available at that number. Powerstar , not APC, can support our modifications, such as the mil connectors. Powerstar tech support is always available too.

Summary: It is recommended from the following detailed writeup, test and checkout when incurring problems can be enhanced if someone is utilizing Powerchute software. The reasoning is that Powerschute allows you to trouble shoot without opening the unit. It also allows you to change critical parameters, such as turning off error indicators, modify hardware

6.1.9 Opening and servicing internal components

The PS6000 is designed for easy service, but remember before you open the top cover that there is high voltage inside. Servicing of high voltage devices such as monitors, Ups, etc, require that only qualified electricians be allowed. We are required to warn you because of government regulations all the dangers of high voltage.

That being said, the following pictorial view of the open unit is supplied.

1. To open the unit use gloves, and phillips screw driver that has a magnetic head, and rubber insulation.
2. Disconnect all power inputs and outlets
3. Push the off button for four seconds to de-energize the unit

4. Turn the EPO, master circuit breaker to off
5. Unscrew the top
6. When open, the first thing to do is disconnect the battery cables
7. The sources of electricity are batteries, heat sink, and motherboard so let it sit for several hours to de-energize, and cool down
8. Never let screws fall inside the unit without immediately picking them up
9. The following are points of attention inside the unit
 - a. Fuses in yellow binding, check for blown fuse
 - b. Circuit breakers, reset if needed
 - c. Battery connectors which are Anderson quick disconnect (always disconnect first)

d. MOV Replacement- Only by qualified Electricians (out of warranty)

Motherboard with MOV protection (Round soldered voltage overload protectors) directly on the motherboard (can be replaced with experienced solderer) You will know if these are the problem, because when unit failed smoke came from them. They protect against a high voltage surge, from mis-wiring at the outlet, internal wire came loose, wall plug wired backwards, European plugs backward, or any other surge of greater than 240v. If these MOV are blackened then they are replaceable, and the motherboard may or may not need replacement.

1. Get solder remover
2. Take burnt MOV off the board with heated soldering wire
3. Replace with same size MOV which Powerstar can supply
4. Solder lightly new Mov into place making sure no extra solder shorts
5. Use meter to test the new solder
6. Find the source of the overvoltage before you test again
7. When found correct it or go no further call Powerstar
8. When corrected, then run cold start first, after putting a protective cover over the top of the UPS
9. If coldstart works, and you have absolutely corrected the cause of overvoltage, then plug in power source with great care(do not turn on yet)
10. If corrected you can now turn on master circuit breaker in back
11. Then turn on UPS from the TEST button on front of unit

e. Wires to and from many points which should be inspected to fraying, loose connections, broken solder points

f. The Isolation Transformer

The Isolation Transformer is a 2kva iso. It is supplied to do many things.

A. Isolate the power grid from the cabinet and the cabinet from the grid. This protects erroneous power anomalies from happening. Very critical in tactical situations

b. Locks out noise, filters harmonics, and cleans sine wave.

C. Service of the isolation transformer is only needed when the UPS is dropped, a military attack which dislodges the unit from its brackets, or a wire is severed.

D. To remove, all power must be removed from Ups. We recommend that you contact powerstar first, and we will assist you free of charge. But if needed, it has two primary hot wires, and two secondary neutral wires. Ground is passed along through the input wire. The wires are color coded. Remove the four bolts holding it down, lift straight up, and snip the wires. Warning: You now have input completely disconnected so, do not attempt to use the UPS until you have reattached the input power wires.

E. If removed the unit is not isolated from the grid, because the UPS is not an isolator.

The unit will work, but in a less than tactical mode. Mil 1399 states input must be isolated from output and the grid of power.

F. The symptoms of a marginal or non-working iso are:

1. Overheating- If you touch the top and it burns you, then call for replacement
2. If UPS does not turn on, then check the internal wire for shock and vibration fraying
3. Bolts have been shocked and vibrated so that insulation inside of unit has shorted to itself

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Powerstar Inc.

Gaithersburg Maryland

301-948-0713

<http://www.powerstarinc.com>

Price of this manual is \$39.00