

# AIRPAX DIMENSIONS

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**OWNERS MANUAL**

**JANUARY 2007**

ISO 9001:2000 Certified Company

**Airpax Dimensions, Inc.**  
**U.P.S.**  
**(Uninterruptable Power Supply)**  
**(External Battery Type)**



**OWNERS MANUAL for Model:**  
**ADI-12/500F U.P.S.**

# OWNERS MANUAL FOR AIRPAX DIMENSIONS

Model ADI-12/500F U.P.S.

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## GENERAL

The Dimensions U.P.S. has been designed and manufactured for many user applications and long life. It utilizes high technology electronic parts and circuitry. The U.P.S. consists of a DC to AC inverter, a battery charger and a transfer relay. The inverter is designed to provide strong, steady, clean AC power. The high power battery charger is designed for fast and complete battery recharging. The voltage controlled transfer relay is fast enough for most sensitive equipment. The features, safety, and reliability you demand for power sensitive equipment are yours at a cost effective price.

## Limited Warranty Terms & Conditions

### SHIPPING TERMS

F.O.B. St. Paul Minnesota - USA.

### LOSS OR DAMAGE

Loss or damage in transit are the responsibility of the carrier. Any claim should be filed with the delivering transport company. Invoice, Bill of Lading and Delivery receipt with damage noted therein must accompany any claims for freight damage. Claims for shortage and lost shipments must be made in writing to Airpax Dimensions, St. Paul, MN within 10 days of date of shipment. Claims not reported within this time frame will not be honored.

### RETURN GOODS POLICY

o No returned materials will be accepted without an accompanying Returned Materials Authorization Number (RMA) from the factory.

o Credit will be issued for returned goods to the original purchaser within 60 days of purchase, provided the inverter is returned to Dimensions unused and not mounted. The amount of credit will be issued at Dimensions discretion based on the condition of the product.

o Customer must be in good standing with Dimensions.

o Inverters that are discontinued, high-voltage (over 24vdc), special-order or used are excluded and will not be eligible for credit. Non-inverter items such as cable assemblies, fuses and fuse holders, will not be eligible for credit

o Support components supplied by Dimensions vendors will be covered under that manufacturer's credit return policy.

o Customer pays return freight.

### PLEASE SHIP AUTHORIZED RETURNS TO:

Airpax Dimensions, Inc. / 4467 White Bear Parkway / St. Paul, MN 55110

### Return Freight Prepaid

### LIMITED WARRANTY

Airpax Dimensions, Inc. extends the following warranty to the original purchaser of those goods subject to the qualifications indicated.

Dimensions warrants to the original purchaser for use that the goods or any component thereof manufactured by Dimensions will be free from defects in workmanship for a period of 1 year from the date of purchase, provided such goods are installed, maintained and used in accordance with Dimensions and the original manufacturer's written instructions.

Components not manufactured by Dimensions, but used within the assembly provided by Dimensions, are subject to the warranty period as specified by the individual manufacturer of said component, provided such goods are installed, maintained and used in accordance with Dimensions and the manufacturer's written instructions.

Dimensions sole liability and the Purchaser's sole remedy for a failure of goods under this limited warranty and for any and all claims arising out of the purchase and use of the goods, shall be limited to the repair or replacement of the goods that do not conform to this warranty.

To obtain repair or replacement service under the limited warranty, the purchaser must contact the factory for a Return Material Authorization (RMA). Once obtained, send the Return Material Authorization Number along with the defective part or goods to: Airpax Dimensions, Inc., 4467 White Bear Parkway, St. Paul, MN 55110, freight prepaid.

THERE ARE NO EXPRESS WARRANTIES COVERING THESE GOODS OTHER THAN AS SET FORTH ABOVE. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO ONE YEAR FROM DATE OF PURCHASE.

DIMENSIONS ASSUMES NO LIABILITY IN CONNECTION WITH THE INSTALLATION OR USE OF THE PRODUCT, EXCEPT AS STATED IN THIS LIMITED WARRANTY. DIMENSIONS WILL IN NO EVENT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

### WARNING: LIMITATIONS ON USE

Dimensions products are not intended for use in connection with Life Support Systems and for Avionic use. Dimensions makes no warranty or representation in connection with their products for such uses.

## 9. Troubleshooting

Dimensions offers free phone consultation (no collect calls) concerning installation or troubleshooting. Call the Customer Service Department at 651-653-7000 or 800-553-6418, fax: 651-653-7600. Before calling, please try the following first. Remember to use a true RMS meter because the output from the inverter portion of the U.P.S. is a quasi-sine waveform. Other type meters will display incorrect readings.

<b><u>PROBLEM</u></b>	<b><u>POSSIBLE CAUSE</u></b>	<b><u>CORRECTION</u></b>
No power Output	Battery state-of-charge and voltage too low	Check battery voltage at the inverter terminals. It should be greater than 12.2 volts.
	Circuit breaker is tripped	Reset output circuit breaker.
	Fuse is blown (on red DC input wire)	Check and replace fuse.
	U.P.S. is not turned on	Slide switch on the front of the unit to "On" position.
	U.P.S. feels hot	The unit may have been shut down by over temperature. The U.P.S. must be left to cool to 40°C. Check to see that the U.P.S. is not in a closed compartment and that it is not over loaded.
The low battery LED is on	Battery protection circuit is on	Turn the U.P.S. "Off" for 5 seconds, then turn "On" again. If the low battery light turns on again, check battery wiring, battery state-of-charge and voltage.
Battery Charger fails to operate	No 220 VAC power	Verify that there is 220 VAC power to the unit.
	Poor connections	Check external power wiring and external circuit breakers or fuses.
	Defective battery	Replace battery

If the above steps are completed and the U.P.S. still does not operate satisfactorily call Airpax Dimensions, Inc. for a Return Authorization number.

## **CAUTIONS:**

**CAUTION:** The U.P.S. produces hazardous voltage. To avoid risk of harm or fire the unit must be properly installed. There are no user serviceable parts inside, do not remove the cover.

**CAUTION:** The U.P.S. should not be mounted in a location that may be exposed to rain or spray.

**CAUTION:** The U.P.S. should not be installed in a zero clearance enclosure.

**CAUTION:** Damage to the U.P.S. will occur if correct polarity is not observed when installing the DC input cables.

**CAUTION:** Damage to the U.P.S. will occur if an external AC power source is applied to the AC output.

**CAUTION:** The U.P.S. contains a circuit breaker and capacitor that may produce a spark. Do not mount in a confined battery or gas compartment.

**CAUTION:** Working in the vicinity of lead acid batteries is dangerous. Batteries generate explosive gases during operation. There is a risk of acid exposure. There is also a risk of high current discharge from shorting the battery that can cause fire and explosion.

**CAUTION:** Be sure both the U.P.S. and the external AC input circuit breaker or fuse are turned "OFF" during installation.

## Inverter Description

The Dimensions Inverter converts 12 volts direct current into 220 volt alternating current with a frequency of 50 cycles per second. The inverter uses a steel transformer, metal oxide silicon field effect transistors (MOSFET's) for switching, and a pulse width modulation (PWM) control semiconductor device to control the output. Inverter protection is provided by the PWM device, additional protection circuitry and a physical thermal-breaker device in the MOSFET heatsink area. A thermally controlled cooling fan also lowers the temperature inside the inverter when needed.

Direct current from the battery enters the inverter and is filtered by a large input capacitor. The direct current is turned on and off by the MOSFET devices at a rate of 50 cycles per second and fed into the transformer. The transformer steps the voltage up to 220 volts. Output voltage and frequency are controlled by the PWM control device as the DC input voltage and/or output load varies.

The output is called a quasi-sine waveform. This is an improvement over a square wave with the advantage of being able to operate almost all AC electrical equipment or appliances, with high surge capability, reliability and efficiency.

## Inverter Features

- Quasi-sine waveform output with a proprietary stabilizer circuit provides clean power for the safe and efficient operation of almost all appliances and equipment.
- Easy installation is provided by wall or shelf mounting capability and simple DC and AC wiring connections.
- Regulated voltage and frequency, with high surge MOSFET's and multiple overload protection methods allow the widest range of product use.
- The noncorrosive aluminum chassis with durable powder coat paint and conformal coated printed circuit boards results in high reliability and long product life.

## 5. 220 VAC 50 HZ Input

*CAUTION:* Damage to the U.P.S. will occur if an external AC power source is applied to the inverter's AC outlet or it's hardwire output.

*CAUTION:* Do not plug the AC cord from the back of the unit into the receptacle in the front of the unit.

Power from the electric utility or generator can be connected to the U.P.S. by plugging in the AC line cord. This cord should be plugged into a grounded receptacle supplying 220 VAC 50 HZ. When the external 220 VAC 50 HZ is supplied, the internal transfer switch is automatically activated and the U.P.S. is turned "off" and the battery charger "on" (but not both at the same time). The output of the U.P.S. is the power supplied to the line cord from the wall receptacle. This U.P.S. does not provide surge protection during this output.

## 6. Automatic Battery Charger

When 220 VAC, 50 Hz power is present to the U.P.S. through the line cord, the U.P.S. is automatically switched into the battery charger mode. An external source of AC generator or shore power must be present before it will operate as a battery charger.

## 7. 220 VAC 50 HZ Output and Operating Instructions

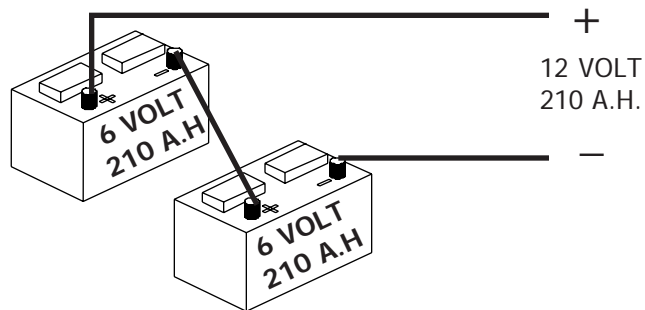
The 220 VAC 50 HZ output of the U.P.S. is provided by the receptacle on the front of the unit. If external power is present on the input cord, that power is automatically switched by the transfer relay to the output receptacle. It is not controlled by the On/Off switch and does not have surge protection. Make sure that the output breaker is reset. You can power your electrical equipment within the inverter power range by plugging into the front receptacle. The continuous rating is 500 watts output. To operate the inverter output of the U.P.S., turn the switch to "On". Turn the switch to "Off" when the U.P.S. is not to be used.

## Battery Connection Methods

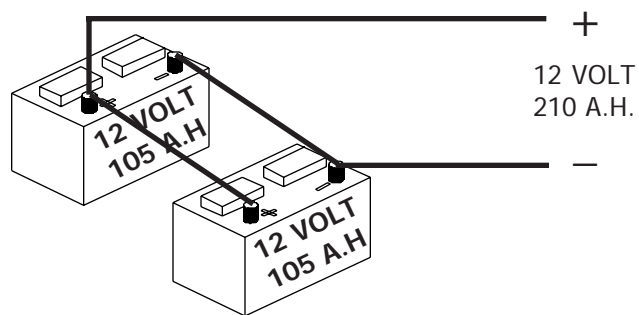
Batteries can be placed in series or parallel, or a combination of both methods to increase both the voltage or amp hour (A.H.) capacity of the battery bank.

Batteries are placed in **series** by connecting the positive post of one to the negative post of the next. This results in a battery bank voltage that is the sum of the individual battery voltages and an ampere hour capacity that is the capacity of one battery.

Batteries are placed in **parallel** by connecting the positive post of each together and the negative post of each together, which results in a battery bank voltage that is the same as the individual batteries and an amp hour capacity that is the sum of the battery's capacities.



**SERIES CONNECTION**



**PARALLEL CONNECTION**

## 3. Installation

Most unsuccessful installations and damaged units are due to reversed polarity when attaching the battery to the U.P.S. Damage to the U.P.S. will occur if the positive terminal of the battery is connected to the negative terminal of the U.P.S. **This damage is not covered under the warranty.** Double check before connecting. The following instructions should be thoroughly read and understood before installation.

**CAUTION:** The U.P.S. produces hazardous voltage. To avoid risk of harm or fire the unit must be properly installed as instructed in this manual.

**CAUTION:** Damage to the U.P.S. will occur if correct polarity is not observed when installing the DC input cables.

**CAUTION:** Damage to the U.P.S. will occur if an external AC power source is applied to the AC outlet.

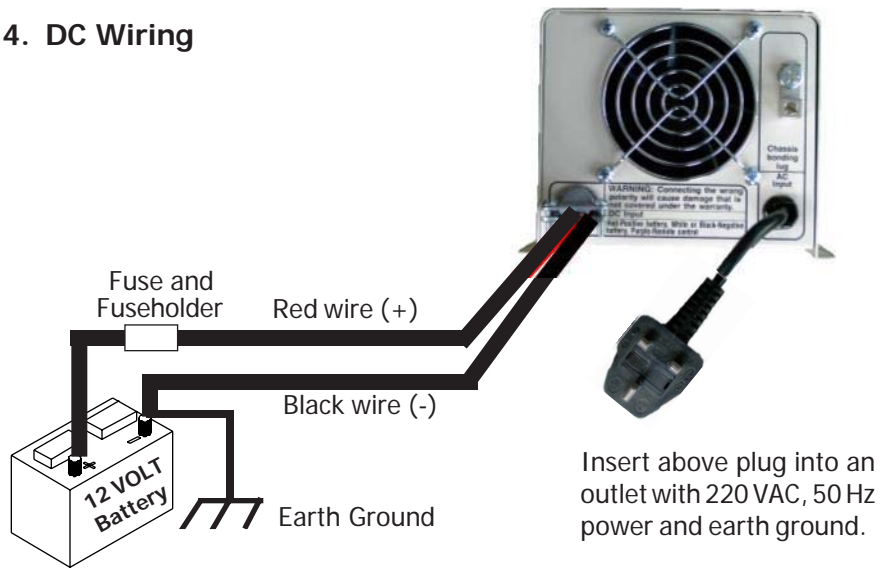
**CAUTION:** Be sure both the U.P.S. and the external AC input circuit breaker or fuse are turned "OFF" during installation.

Locate a suitable, secure flat mounting surface as close to the battery as possible without being in the same air tight compartment. Batteries generate explosive gases during normal use which can be ignited by a spark resulting in risk of harm and damage. The location should have adequate ventilation and clearance around the unit to maintain room temperature while the unit is operating. At least 1/2 inch of clearance is required on all sides for unrestricted air flow.

After having selected the location, secure the unit with #8 or larger screws or bolts in the mounting slots on the flanges of the chassis.

**NOTE:** All wiring must follow Codes in effect at the time of installation, regardless of suggestions in this manual. All wires should be copper conductors.

#### 4. DC Wiring



**Battery Wiring - FIG. 1**

**CAUTION:** Make sure that hydrogen gas does not accumulate near the battery by keeping the area well ventilated. A spark may result when connecting the final battery wiring due to an initial charging of the U.P.S. internal input capacitor.

**CAUTION:** Connecting the U.P.S. incorrectly to the battery with the polarity reversed will cause damage that is not covered under warranty!

#### Procedure:

1. Be sure that the switch on the front of the U.P.S. unit is turned "OFF".
2. Connect the Black wire of the U.P.S. to the negative (-) post on the battery first. Make sure that tight, clean connections are made.
3. The green Light Emitting Diode (LED) on the end of the red wire from the U.P.S. is to assure correct polarity during installation and will light if correct. Touch the lead end of the green LED to the positive (+) post of the battery. The LED should light indicating correct battery polarity. If not, the polarity is reversed, or the battery is not charged. Recheck the polarity or charge/replace the battery. A mounting spark may result when

- The U.P.S. has indicator lights which allow easy observation of the inverter status.
- The U.P.S. has internal protection against output short circuit, output overload and high temperature conditions. Also there is a thermally controlled cooling fan.
- The U.P.S. is designed to operate any 220 VAC, 50 Hz, single phase appliance, equipment or tool within its power ratings, unless the equipment is specifically designed for a pure sine waveform.
- The inverter has a short term rating of 600 watts and a continuous rating of 500 watts output.
- The battery charger converts 220 VAC, 50 Hz to 12 VDC for recharging the battery. The battery charger is rated at 20 amperes D.C. continuous.
- The transfer relay is rated at 5 amperes AC and has a typical switching time of 0.006 seconds.

#### Choosing the Proper Battery Type

The proper type of battery to use with the U.P.S. is called a traction battery. They are also called deep cycle or golf cart type batteries. Traction batteries are designed for maximum life in cyclic applications (repeated discharge/charge cycles). Automobile starting or stationary batteries should not be used, because they are not designed for the charge/discharge cycles required in inverter use.

#### Maximum Battery Bank Recommendations

A 210 ampere hour capacity battery bank is the largest size that can be recharged in a sixteen hour time frame. This is based on full AC input power for the battery charger, and 80% discharged batteries.