

# **ANALYTIC SYSTEMS**

Power Conversion Solutions

## **INSTALLATION & OPERATION MANUAL**

### **PWS610 SERIES Power Supply**



An ISO9001 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

8128 River Way, Delta B.C. V4G 1K5 Canada T. 604.946.9981 F. 604.946.9983 TF. 800.668.3884 (US/CANADA)

[www.analyticsystems.com](http://www.analyticsystems.com)



**ANALYTIC SYSTEMS**  
Power Conversion Solutions

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# POWER SUPPLY

## IMPORTANT SAFETY INSTRUCTIONS



**SAVE THESE INSTRUCTIONS** — This manual contains important safety and operating instructions for the power supply.

### POWER SUPPLY PRECAUTIONS

1. Do not expose the power supply to rain or snow unless it is a sealed model.
2. Use of an attachment not recommended or sold by the power supply manufacturer may result in a risk of fire, electric shock, or injury to persons.
3. Do not disassemble the power supply; return it to the manufacturer or an authorized service center when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire. Voltages in excess of 350 volts are present inside the power supply anytime it is plugged into an AC outlet, even if it is switched off.
4. To reduce risk of electric shock, unplug the power supply from the AC outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
5. Never place the power supply directly above a battery; gases from battery will corrode and damage the power supply.
6. Never allow battery acid to drip on the power supply.

### GROUNDING AND AC POWER CORD CONNECTION INSTRUCTIONS

The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

**DANGER** Never alter the AC power cord or plug provided. If it will not fit the output, use an approved adapter or have the proper AC power cord installed by a qualified electrician. Improper connection can result in the risk of electric shock.

#### Medical Equipment Notice

Analytic Systems does not recommend the use of their products in life support applications where failure or malfunction of this product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Analytic Systems does not recommend the use of any of its products in direct patient care. Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), auto-transfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as “critical” by the U.S. FDA.



## **Introduction**

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All new Current Mode switching design offers increased power and reliability in a compact package. Extra input and output filtering reduce EMI to extremely low levels. Reliability features include an input fuse, thermal shutdown, current limiting and output short circuit shutdown with automatic recovery. The output voltage is easily adjusted 1.0 volts above or below the standard output voltage. An output overvoltage crowbar circuit protects devices connected to the converter. The PWS610 Series Power Supply supplies 12, 24, 32 or 48 VDC from a 110 or 220 VAC power source. Other output voltages up to 48 volts are available. High quality digital meters can be added (factory option) to allow monitoring of the output current and voltage.

## **Box Contents**

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The box you have received should contain the following:

- One PWS610 Power Supply
- This manual
- One Warranty Card

*If anything is missing or damaged please contact your dealer or Analytic Systems for a replacement*



# Specifications

Input Voltages				
Nominal (ip)	110Vac		220Vac	
Actual	105 - 125Vac		210 - 250Vac	
Input Amps (max)	8.4		4.2	
Input Fuse (slow blow)	MDA-12		MDA-6	
Output Voltages				
Nominal (op)	12Vdc	24Vdc	32Vdc	48Vdc
Actual	13.6 ± 0.05Vdc	27.2 ± 0.05Vdc	36.3 ± 0.05Vdc	54.4 ± 0.10Vdc
Adjust	± 1.0 Vdc			
Output Crowbar	16.0 ± 0.5 Vdc	32.0 ± 1.0 Vdc	42.7 ± 1.3 Vdc	63.9 ± 2.0 Vdc
Output Amps (cont)	40	20	15	10
Output Amps (max)	45	25	18	12.5
Transient Response	< 1 V for 50% surge			
General				
Input Frequency	45 - 65 Hz			
Noise on Input	< 50 milli-Volts			
Noise on Output	< 50 milli-Volts			
Efficiency	> 80 % @ maximum output			
Temp. Range	-25 to +40 deg. C @ maximum output			
Isolation	Input-Output & Input-Case 1500 Vdc Output-Case 500 VDC (1500Vdc @ 48 V Out)			
Length	14.5 in / 36.8 cm			
Width	10.2 in / 25.9 cm			
Height	3.0 in / 13.0 cm			
Clearance	1 Inch (2.5 cm) all around			
Material	Marine Grade Aluminum			
Finish	Black Powder Epoxy			
Fastenings	18-8 Stainless			
Weight	7.2 lb / 3.3 kg			

\*\* Actual startup is at 22, 42, or 67Vdc Input, depending on model

\* This is Analytic Systems' suggested range. Please consult your battery manufacturer for their recommendations.

\* Specifications subjects to change without notice.

Designed and manufactured by: **ANALYTIC SYSTEMS WARE (1993) LTD.**

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# Installation

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## MOUNTING

Mount the unit in a DRY location. Allow at least 4 inches of clearance around it for adequate cooling.

## POWER CONNECTION

The unit is supplied with a 5 foot power cable. This should normally be adequate to connect to a source of power. If you must extend the power cable be sure to use a 3 conductor grounded type extension cable. For hard wiring to a source of power, cut off the plug, and strip the wires as necessary. The wire colours are

110 VAC	220 VAC
Brown - AC Hot	Brown - AC Hot / Phase 1
Blue - AC Neutral	Blue - AC Neutral / Phase 2
Green - Ground	Green/Yellow - Ground

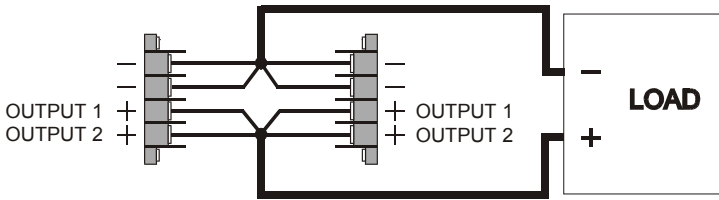
All connections should be made inside an appropriate junction box. The maximum current draw from a 110 VAC source is 8.1 amps, so a 10 amp circuit breaker should be used in the circuit panel. For a 220 VAC source, 4 amps is the maximum current draw, so a 5 amp circuit breaker should be used in the circuit panel to feed power to the PWS610.

## OUTPUT CONNECTIONS

Two Positive output terminals and two Negative output terminals are provided. Connect only one wire to each terminal. Ensure that the total average load connected does not exceed the continuous current rating of the unit.

## LOAD SHARE OPTION

The units may be configured for load sharing if they are equipped with the optional output isolation diodes. To confirm that your unit has these diodes, use an ohmmeter to measure the resistance between the two positive output terminals. If the diodes are present the terminals will measure as not connected. If the diodes are NOT present, the terminals will measure as a short circuit. Assuming the output isolation diodes are present, connect one 4 foot piece of #12 AWG red wire to each positive output terminal. Connect all the positive wires to a distribution bus, or connect them together, and then connect from the common point to the load using the correct gauge of wire for the total output capability of all the supplies running in parallel. Repeat this process for the negative terminals using the same gauges of wire, but black in colour. These units should now load share. You can confirm this by watching the output ammeters. A slight difference is negligible, however, if this is not the case, you can increase the output voltage of the unit that is reading low using the output adjust potentiometer.



## Operation

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Turn the switch on the top of the unit on to energize the outputs. The green 'Output On' indicator light will glow to indicate the proper operation of the unit.

### OUTPUT ADJUSTMENT

The unit has an adjustment potentiometer to allow up to +/- 1.0V adjustment of the output voltage. This potentiometer is accessed through a small hole in the top of the power supply. As shipped from the factory, the unit is preset for a voltage of 13.6, 27.2, 36.3 or 54.4VDC. If you wish to adjust this voltage, remove the cover plate (secured by 2 screws) to expose the Output Adjust potentiometer. Reach in with a very small flat blade screwdriver to rotate the potentiometer. Clockwise increases the output voltage and counter clockwise decreases it. When you are done, replace the cover plate and securely tighten the screws.

## Meters

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High quality digital meters can be added to the charger (factory installed only). Both outputs can be monitored for current and voltage.

# Dry Contact Relay

To use your dry contact output fail relay you must connect a 9-pin D connector to the unit. You must use pins one and six as is indicated on page 6 in the remote connector diagram.

The relay is factory preset to fail in the closed position when the low output LED and buzzer come on. If you wish to have the relay fail in the open position when the low output LED and buzzer come on, you must take the cover off the unit and move the jumper to the other position on J22. J22 is located next to the relay.

To change the position of the jumper, first turn the unit off and disconnect the unit from both the power and load(s). Next, turn the unit on for 30 seconds to discharge the capacitors, then turn it off again. Remove the eight screws holding on the cover. Turn the unit upside down, remove the cover and locate J22. It will be next to the relay as is shown in the above diagram. Simply move the jumper to the desired position as is shown in the above diagram. Replace the cover and re-install the eight screws. Reconnect the unit to the power and load(s).



# Remote Control Option



**IMPORTANT:** This remote is to be used only on Power Supplies manufactured by Analytic Systems.

A remote control panel may be connected to the power supply using a 9-pin D-connector that attaches to the side of the power supply. The remote control panel and D connector are part of the remote control option. The remote control panel allows the unit to be operated remotely as well as duplicating all the diagnostic indicators and audible alarm.

## REMOTE CONNECTOR

This connector is located on the side of the unit. Important: To prevent the possibility of High Voltage Electrical Shock, do not power up the Power Supply unless all wiring from the unit to the remote is securely connected. Do not remove the dust cover from the DB-9 connector if the remote is not being used.





# Troubleshooting

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This unit provides LED indicators and a buzzer to help diagnose any problems. The unit should sound the buzzer to alert you prior to shutting itself down. You should immediately check the indicators to determine the cause of the shutdown.

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<b>LOW OUTPUT</b>	Indicates that the output voltage is below normal because:
	<ul style="list-style-type: none"><li>• The current demanded by the devices connected to the unit exceeds the maximum output current rating, thereby causing the output voltage to drop to maintain the current at the maximum level,</li></ul>
	<ul style="list-style-type: none"><li>• The input voltage is not high enough for unit to operate</li></ul>

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<b>LOW INPUT</b>	Indicates that the input voltage is below normal because:
	<ul style="list-style-type: none"><li>• The input voltage is not in the correct range for proper operation of the unit.</li></ul>

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<b>OVERTEMP</b>	Indicates that the unit is running too hot because:
	<ul style="list-style-type: none"><li>• Too much power is being drawn, turn off or unplug some devices.</li></ul>
	<ul style="list-style-type: none"><li>• The unit is located in a poorly ventilated area.</li></ul>

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If the load exceeds the continuous rating for too long a period, the temperature sensor inside the unit will turn off the outputs. After the unit cools sufficiently, it will automatically come back on. If this happens frequently, remount the unit for increased airflow so it cools better.



# Special Services & Options

A	Line AC Detect & Autoswitch UPS
B	Battery Backup (1A CHG INSTANT ON BATTERY BACKUP FOR RACKMOUNT PWS/VTC MODELS)
C	COTS   MIL461F, MIL810G (MIL Connectors) (VIBRATION PROTECTION) (WIDE TEMP {-40 to +55°C}) (IN-HOUSE TESTED AND REPORT FOR EACH UNIT- AVAILABLE AS ADD ON TO M OPTION)
D	Paralleling Diodes - Parallel Multiple PWS or VTC units
E	European ROHS compliant (LEAD FREE MANUFACTURED)
F	Electric Fork Lift (FILTERING AND SURGE SUPPRESSION)
G	GMDSS (Charger c/w Digital Volt/Amp Meter & RCP1-BCA Remote Control)
H	High Output (VTC120)
I	MIL461F (IN-HOUSE TESTED AND REPORT FOR EACH UNIT- AVAILABLE AS ADD-ON TO M OPTION)
J	MIL810G (IN-HOUSE TESTED AND REPORT FOR EACH UNIT- AVAILABLE AS ADD-ON TO M OPTION)
K	Synchronized Inverters
L	not assigned
M	Military Rugged Package (MIL Connectors) (VIBRATION PROTECTION) (WIDE TEMP {-40 to +55°C})
N	Encapsulated
O	Open Frame - No chassis just heat sink bars (NOT FOR ALL PRODUCTS)
P	Portable (CARRYING HANDLE, RUBBER FEET)
Q	23" Rackmount Chassis c/w Digital Volt/Ammeter (FOR 610, 615, 1000, 1015 MODELS)
R	19" Rackmount Chassis c/w Digital Volt/Ammeter (FOR 610, 615, 1000, 1015 MODELS)
S	not assigned
T	not assigned
U	Safety Special Inspection (CSA/UL)
V	Integrated Digital Volt/Ammeter
W	IP66 Water Resistant Chassis
X	Heavy Duty Ruggedization (VIBRATION PROTECTION) (WIDE TEMP {-40 to +55°C})
Y	IP67 Water Tight Chassis (IN-HOUSE TESTED AND REPORT FOR EACH UNIT)
Z	No Conformal Coating

View/download an expanded description of our Special Services & Options online  
<https://www.analyticsystems.com/download>



## Limited Warranty

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1. The equipment manufactured by Analytic Systems Ware (1993) Ltd. (the "Warrantor") is warranted to be free from defects in workmanship and materials under normal use and service.
2. This warranty is in effect for:
  - a. 3 Years from date of purchase by the end user for standard products offered in our catalog.
  - b. 2 Years from date of manufacture for non-standard or OEM products
  - c. 1 Year from date of manufacture for encapsulated products.
3. Analytic Systems will determine eligibility for warranty from the date of purchase shown on the warranty card when returned within 30 days, or
  - a. The date of shipment by Analytic Systems, or
  - b. The date of manufacture coded in the serial number, or
  - c. From a copy of the original purchase receipt showing the date of purchase by the user.
4. In case any part of the equipment proves to be defective, the Purchaser should do the following:
  - a. Prepare a written statement of the nature of the defect to the best of the Purchasers knowledge, and include the date of purchase, the place of purchase, and the Purchasers name, address and telephone number.
  - b. Call Analytic Systems at 800-668-3884 or 604-946-9981 and request a return material authorization number (RMA).
  - c. Return the defective part or unit along with the statement at the Purchasers expense to the Warrantor; Analytic Systems Ware (1993) Ltd., 8128 River Way, Delta, B.C., V4G 1K5, Canada.
5. If upon the Warrantor's examination the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense by the most economical means. Requests for a different method of return or special handling will incur additional charges and are the responsibility of the Purchaser.
6. Analytic Systems reserves the right to void the warranty if:
  - a. Labels, identification marks or serial numbers are removed or altered in any way.
  - b. Our invoice is unpaid.
  - c. The defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.
7. No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so.
8. Only the Warrantor shall perform warranty service. Any attempt to remedy the defect by anyone else shall render this warranty void.
9. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion except for equipment specifically stated to be waterproof.
10. No other express warranty is hereby given and there are no warranties that extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.
11. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof.
12. The Warrantor assumes no liability for incidental or consequential damages of any kind




DESIGNED AND MANUFACTURED BY




**ANALYTIC SYSTEMS**  
Power Conversion Solutions


Battery Chargers • Inverters • Power Supplies • Voltage Converters

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