



ANALYTIC SYSTEMS

Power Conversion Solutions

INSTALLATION & OPERATION MANUAL

VTC1000 Series Voltage Converter



An ISO9001 and AS9100 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

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VOLTAGE CONVERTERS

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS — This manual contains important safety and operating instructions for the voltage converter

VOLTAGE CONVERTER PRECAUTIONS

1. Do not expose the voltage converter to rain or snow unless it is a sealed model.
2. Use of an attachment not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.
3. Do not disassemble the voltage converter. If service or repair is required, return it to the manufacturer or an authorized service center. Incorrect reassembly may result in a risk of fire or electric shock. Voltages up to 350 volts are present inside the voltage converter any time it is connected to input power, even if it is switched OFF.
4. To reduce risk of electric shock, disconnect the voltage converter from the input power before attempting any maintenance or cleaning. Switching the voltage converter to OFF will not reduce this risk.
5. Never place the voltage converter directly above a battery; gasses from the battery will corrode and damage the voltage converter.
6. Never allow battery acid to drip onto the voltage converter.

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 reasonable expected to cause the failure of the life support device or to significantly affect its safety or effectiveness. Analytic Systems does not recommend the use 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 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

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, reverse battery hookup protection 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 VTC1000 Series Voltage Converter supplies either 12, 24, 32 or 48 VDC from a 110, 250 or 300 VDC power source. Other input voltages up to 300 volts or output voltages up to 48 volts are also available by special order. High quality digital meters can be added (factory option) to allow monitoring of output current and output voltage.

Specifications

Input Voltages				
Nominal (ip)	110	250	300	
Actual (Vdc)	100 - 140	230 - 280	280 - 360	
Input Amps (max)	14.5	6.3	5.2	
Input Fuse (slow blow)	MDA-20	MDA-10	MDA-6	

Output Voltages				
Nominal (op)	12	24	32	48
Actual	13.6 ± 0.05V	27.2 ± 0.05V	36.3 ± 0.05V	54.4 ± 0.05V
Output Adjustment	± 1.0 Volts			
Output Crowbar	16.0 ± 0.5 V	32 ± 1.0 V	43.7 ± 1.3 V	63.9 ± 2.0 V
Output Amps (cont)	60	40	30	20
Output Amps (max)	70	45	34	22.5

**General**

Efficiency	> 85 % @ maximum output
Temp. Range	-25 to 40 deg. C @ maximum output
Isolation	Input-Output & Input-Case 1500 Vdc (500 Vdc @ 24 V In), Output-Case 500 VDC (1500Vdc @ 48 V Out)
Dimensions	14.5 x 10.2 x 5.0 in / 37 x 25 x 13 cm
Clearance	1 Inch (2.5 cm) all around
Material	Marine Grade Aluminum
Finish	Black Anodized
Fastenings	18-8 Stainless
Weight	12 lbs / 5.5 kg

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

* Specifications subjects to change without notice.

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

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Installation

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 power leads about 3 feet long. This should normally be adequate to connect to a source of power. If you must extend the power leads, be sure to use at least a good quality (typeTEW) AWG #12 wire. The wire colours are:

Red - Positive

Black- Negative

All connections should be made inside an appropriate junction box. Refer to the specifications table for the correct sizing of the circuit breaker in the distribution panel.

A ground stud is provided to bond the chassis to local ground to reduce or eliminate EMI.

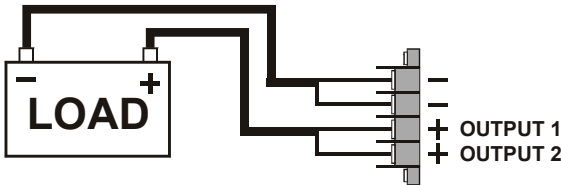
OUTPUT CONNECTIONS

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.

To ensure spark free connections the power switch must be in the OFF position prior to making the connections to the load(s).

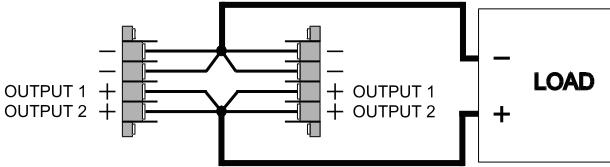
For 12Vdc Model Only!

For 12 Vdc models only, the output terminals must be connected as shown below if the load current is greater than 50 amps!





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 a one-foot piece of red wire of the appropriate gauge (as shown in the table below)

Output Voltage (Vdc)	12	24	32	48
Wire Gauge (AWG)	#8	#10	#12	#14

to each positive output terminal. Connect all the positive wires to a distribution bus, or connect them together. 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 acceptable. If there is more than a slight difference, then increase the output voltage of the unit that is reading low using the output adjust potentiometer.

Operation

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

As shipped from the factory, the unit is preset to 13.6, 27.2, 36.3 or 54.4VDC. You may check this voltage at the output terminals of the unit with a good digital voltmeter. If you wish to adjust the output 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

A high quality digital meter can be added to the voltage converter (factory installed only). The meter shows simultaneous voltage and current on either of the two output terminals. A toggle switch permits selection between the output terminals. The meter features bright LED readouts to permit easy monitoring from many feet or meters away.

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 on J10 to the other position. J10 is located next to the relay K1.



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 J10. It will be next to the relay K1 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 cover screws. Reconnect the unit to the power and load(s).

Remote Control Option



IMPORTANT: This remote is to be used only on Voltage Converters manufactured by Analytic Systems.

A remote control panel may be connected to the voltage converter using a 9-pin D-connector that attaches to the side of the voltage converter. 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 Voltage Converter 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.



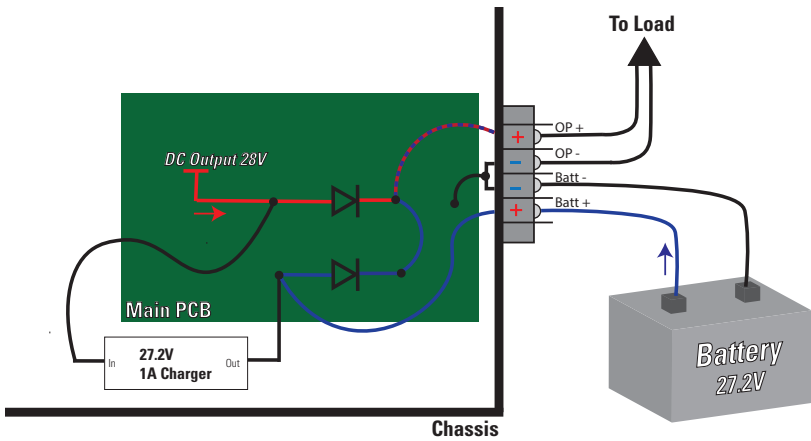
Battery Backup (Optional)

The Battery Backup Option allows the unit to switch to using a connected battery as a power source in the event of external power failure.

The DC power output normally supplies the load while the battery is maintained at full charge by a 1A trickle charger built into the unit. In the event of an input power failure, the load instantly switches over to using the battery as replacement power source, running until either the battery is fully discharged or the load goes into low voltage shutdown. Once power is restored, the DC output will resume supplying power to the load and the trickle charger will recharge the battery.

To set up the Battery Backup:

1. Connect the Load to the output terminals labelled **OP+** and **OP-**
2. Connect the Battery to the output terminals labelled **Batt+** and **Batt-**
3. Turn the unit ON



Note: The diagram shows the voltage settings for a 24V system, but this option is available for every standard output voltage.

The Battery Backup circuit is designed so the battery is normally reverse biased. Essentially, whichever source has the higher voltage will take precedence in supplying power to the load. If the Voltage Output (V_{Out}) is greater than the Battery Voltage (V_{Batt}), current will only flow from V_{Out} to the load. The path of this current is indicated in **red**.

If V_{Out} drops below V_{Batt} , the current will flow from the battery to the load. The path of this current is indicated in **blue**. The configuration of the schottky diodes prevents this current from feeding back into the unit.

TIP: Size your batteries correctly.

Choose batteries with enough amp-hour capacity to power the load for the required amount of time in a power outage.



Troubleshooting

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.

OVERLOAD	Indicates that the output current has exceeded the continuous rating of the unit.
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LOW OUTPUT	Indicates that the output voltage is below normal because:
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The current demanded by the devices connected to the unit exceeds the maximum output current rating, causing the output voltage to drop to maintain the current at the maximum level,

The input voltage is not high enough for unit to operate.

LOW INPUT	Indicates that the input voltage is below normal because:
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The input voltage is not in the correct range for proper operation of the unit.

OVERTEMP	Indicates that the Battery Charger is running too hot because:
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Too much power is being drawn, turn off or unplug some devices.

The Battery Charger is located in a poorly ventilated area.

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.



Limited Warranty

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



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