

# INSTALLATION & OPERATION MANUAL

## VTC610R SERIES Voltage Converter



# VOLTAGE CONVERTERS

## IMPORTANT SAFETY INSTRUCTIONS

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**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

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The model VTC610 Voltage Converter supplies 12, 24, 32 or 48VDC from a 110, 250 or 300 VDC power source. The 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 short circuit shutdown with automatic recovery. The output voltage is easily adjusted 1.0 volts above or below the standard output voltage to accommodate special requirements. High quality digital meters can be added (factory option) to allow monitoring of charging current and charging voltage.

# Specifications

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Input Voltages				
Nominal (ii)	110	250	300	
Actual	100-140	230 – 280	280-360	
Input Amps (max)	8.0	3.5	2.9	
Input Fuse (slow blow)	MDA-10	MDA-4	MDA-4	

Output Voltages				
Nominal (oo)	12	24	32	48
Actual	13.6 ± 0.05V	27.2 ± 0.05V	36.3 ± 0.05V	54.4 ± 0.05V
Output Adjust	± 1.0 Volts			
Output Crowbar	16.0 ± 0.5 V	32.0 ± 1.0 V	42.7 ± 1.3 V	63.9 ± 2.0 V
Output Amps (cont)	40	20	15	10
Output Amps (max)	45	25	18	12.5

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## General

Switching Frequency	60 ± 2 KHz
Idle Power	< 10 Watts
Noise on Input	< 50 milli-Volts
Noise on Output	< 50 milli-Volts
Transient Response	< 2V for 50% Surge (Output Amps/2)
Efficiency	> 85 % @ 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)
Width	19.0 in. / 48.3 cm
Height	3.5 in. / 8.9 cm
Depth	13.5 in. / 34.3 cm
Clearance	1 Inch (2.5 cm) all around
Material	Marine Grade Aluminum
Finish	Black Powder Epoxy
Fastenings	18-8 Stainless
Weight	10.4 lb / 4.7 kg

\* Specifications subjects to change without notice.

# 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 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) AWG12 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.

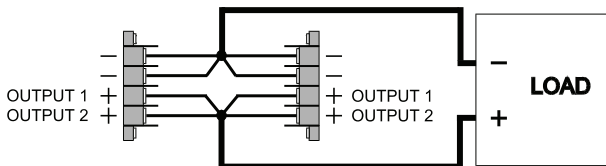
A ground stud is provided to bond the chassis to local ground to reduce or eliminate EMI.

## 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.

## 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 one of the positive output terminals and one of the negative terminals. If the diodes are present the terminals will measure as not connected. If the diodes are NOT present, the terminals will measure the static load resistance. Value depends on the output voltage of the unit. Assuming the output isolation diodes are present, connect one 4 foot piece of #14 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 front 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  $\pm 1.0V$  adjustment of the output voltage. This potentiometer is accessed through a small hole in the front of the voltage converter. As shipped from the factory, the unit is preset for a voltage of 13.6, 27.2, 36.3 or 54.4VDC. Reach in with a very small flat blade screwdriver to rotate the potentiometer. Clockwise increases the output voltage and counter clockwise decreases it.

## METERS

The meter shows simultaneous voltage and current. It features bright red LED readouts to permit easy monitoring from many feet or meters away.

## Dry Contact Relay

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The dry contact output fail relay is accessed through the small 3-connection terminal block at the back of the converter. The user has a choice of using either the normally open or normally closed contacts. To connect to the relay, connect one wire to the common (COM) terminal and connect the other wire to either the normally open (NO) or the normally closed (NC) terminal.



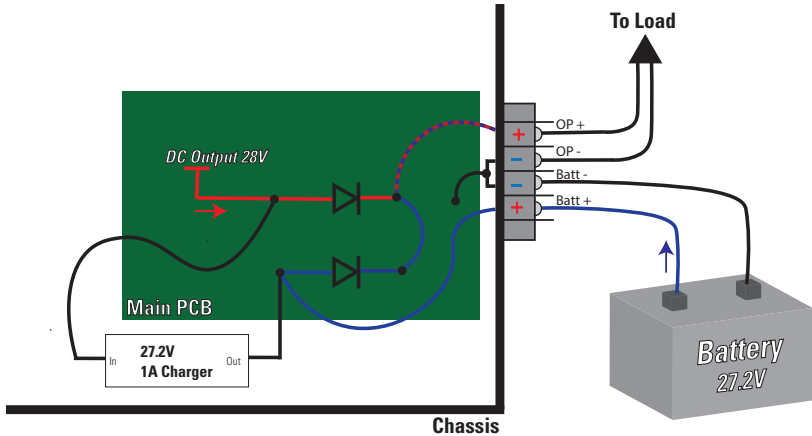
# Battery Backup (Optional)

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 backfeeding 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

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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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**LOW OUTPUT**

Indicates that the output voltage is below normal because:

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,

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

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**LOW INPUT**

Indicates that the input voltage is below normal because:

The input voltage is not in the correct range for proper operation of the unit.

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**OVERTEMP**

Indicates that the voltage converter is running too hot because:

Too much power is being drawn, turn off or unplug some devices.

The Battery Charger is located in a poorly ventilated area.

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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.

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# 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
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