

# **ANALYTIC SYSTEMS**

Power Conversion Solutions

## **INSTALLATION & OPERATION MANUAL**

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### **VTC605 SERIES VOLTAGE CONVERTER**





# VOLTAGE CONVERTER

## 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; 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 of up to 350 volts are present inside the voltage converter anytime it is connected to input power, even if it is switched off.
4. To reduce risk of electric shock, unplug the voltage converter from the DC power source before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
5. Never place the voltage converter directly above a battery; gases from battery will corrode and damage the voltage converter.
6. Never allow battery acid to drip on 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 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.



## **TABLE OF CONTENTS**

- Front Cover, Product Photo and Title
- Product warnings and advisories
- Table of Contents
- Description/Overview of product
- Main Parts
- Operation instructions
- Mounting Instructions
- Connection instructions
- Configuration instructions
- Options
- Faults
- Specifications
- Warranty





## Introduction

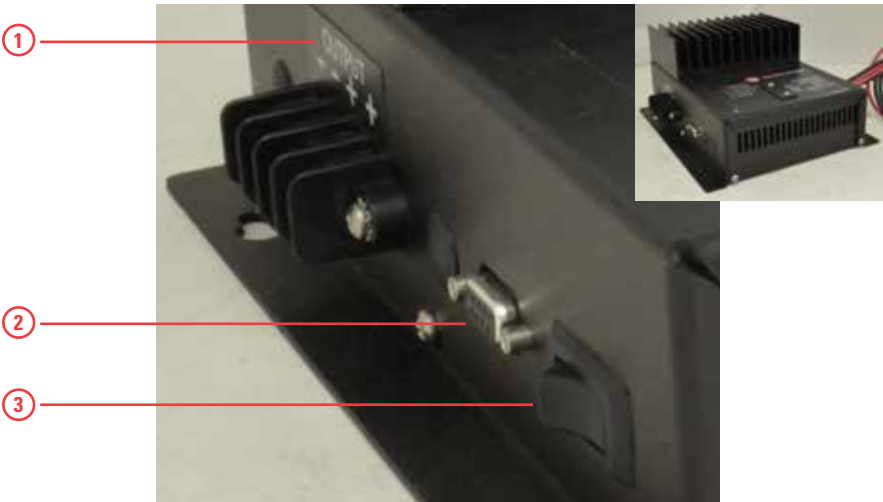
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Step up a 12 VDC battery to between 13.5 and 17.0 or 24.0 and 27.5 VDC in 0.5 VDC increments (via 3 position DIP switch), or stabilize a 12 or 24 VDC power system. Safety features include reverse input protection, low input voltage alarm, low output voltage alarm, over temperature shutdown and alarm, and output overvoltage crowbar. If the input voltage exceeds the regulated output voltage, the unit simply passes the voltage through with full LC filtering and a single schottky diode drop (0.5 VDC or less). Optional features include a dry contact alarm relay output, and remote panel monitoring with On/Off control.

Applications include temporarily brightening 12 volt headlights or work lights, increasing voltage into an automotive or marine ignition system for hotter spark and/or prevention of failures due to voltage drop during engine start, stabilizing 12 and 24 VDC power systems in marine, automotive or aeronautical environments and more.

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## Main Parts



### Left Side of Chassis

1. Output Connections
2. Remote Control Connector
3. On/Off Switch



### Right Side of Chassis

1. Ground Stud
2. Input Fuses (2x)
3. Input Wires, 2x Positive and 2x Negative



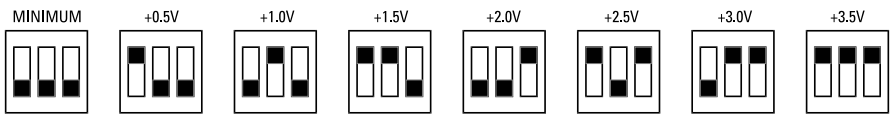
### Top of Chassis

1. Indicator LEDs
2. Output Voltage Adjust DIP Switches

## Operation

To turn the unit on, simply press the Power push button. The alarm buzzer will sound and the Low Output LED will come on briefly, and then the green OUTPUT ON LED will illuminate. The unit will provide the regulated voltage from no load to the maximum load shown in the specifications section. You may check this voltage at the output terminals of the unit with a good digital voltmeter.

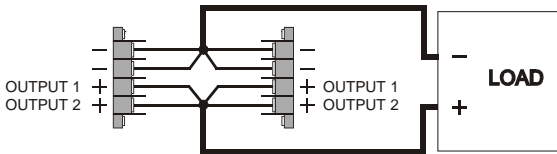
## Output Voltage Adjustment



BLACK PORTION INDICATES SWITCH IS PUSHED DOWN

To adjust the output voltage, turn off the power switch. Remove the plate from the top of the box. Reach in with a non-conductive device such as a pencil and open or close the dip switches as shown below to select the desired output voltage. Replace the plate. Turn the power switch on.

## Load Share Option (D Option)

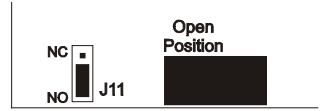
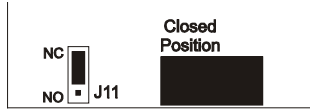


Two or more units may be configured for load sharing if they are equipped with the optional output isolation diodes. Connect a one foot piece of red wire of the appropriate gauge from each positive output terminal to a common connection point to further assist in even load sharing. Set each voltage converter for the same output voltage.



# Dry Contact Relay

The relay is factory preset to fail closed when the low output LED and buzzer come on. If your system detects an alarm condition when the voltage converter is operating normally, you must take the bottom cover off the unit and move the jumper on J11 (located next to the dry contact relay) to opposite position as follows:



1. Disconnect the input power from the unit.
2. Turn the power switch ON to discharge the internal storage capacitors
3. Turn the unit over and remove the 4 cover screws.
4. Move the jumper on J11 to the opposite position
5. Reassemble the unit
6. Making sure the power switch is OFF, reconnect the input power
7. Turn the power switch on and check for proper operation of the dry contact relay.

# Remote Control

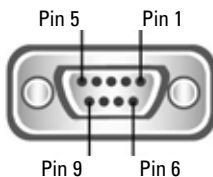
A model RCP1-VTL Remote Control panel may be connected to the voltage converter using the 9-pin D-connector on the left side of the voltage converter. The remote control panel allows the unit to be operated remotely as well as duplicating all the diagnostic indicators and audible alarm.



**IMPORTANT:** This remote is to be used only with Voltage Converters manufactured by Analytic Systems

## REMOTE CONNECTOR

This connector is located on the left side of the unit. Important: The function of each pin is shown in the table, and the location of each pin in the connector in the diagram below.



DRY CONTACT ALARM RELAY	←	1
DRY CONTACT ALARM RELAY	←	6
REMOTE OFF CONNECT TO 5 TO FORCE UNIT TO OFF	←	3
OVER TEMP NORMALLY HIGH (+12V) GOES LOW ON OVER TEMPERATURE	←	7
LOW INPUT NORMALLY HIGH (+12V) GOES LOW WHEN INPUT GOES LOW	←	3
OVERLOAD NORMALLY HIGH (+12V) GOES LOW WHEN UNIT OVERLOADED	←	8
LOW OUTPUT NORMALLY HIGH (+12V) GOES LOW WHEN OUTPUT GOES LOW	←	4
+12 VDC	←	9
GROUND COMMON FOR SWITCHES REFERENCE VOLTAGE FOR REMOTE OFF	↓	5

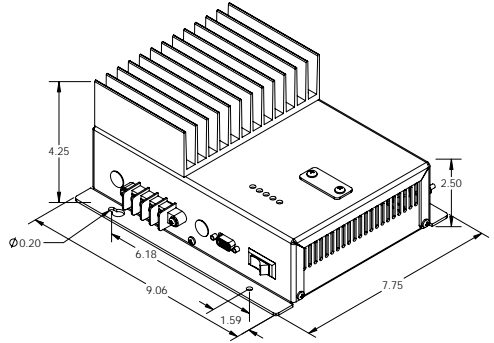
# Installation

## Mounting

Mount the unit and allow at least 1 inch of clearance around the heat sink fins for adequate cooling.

## Input Connection

This unit is equipped with 2 pairs of AWG10 input leads approximately 1.0 meter in length for connection to the DC power source rated for at least 60 Amps. Red is Positive and Black is Negative. If the input leads need to be extended, use at least AWG10 wire for each lead.



## 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.

Note that the current specifications are for input current. To obtain the maximum output current capability at any given input voltage, use the following formula:

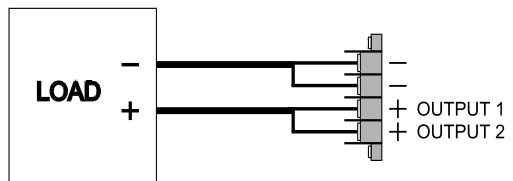
$$\text{Output Current} = \text{Input Volts} / \text{Output Volts} \times 45$$

For example:

10 VDC in and 27 VDC out, the max output current =  $10/27 \times 45 = 16.7$  Amps.

20 VDC in and 27 VDC out, the max output current =  $20/27 \times 45 = 33.3$  Amps

Each output terminal is rated for 25 Amps, so do not connect more than 25 amps of load to either output terminal. If the load exceeds 25 Amps but not the continuous rated output of the unit, the output terminals must be connected to the load in parallel ensuring that the wiring used has sufficient capacity to handle the current.







# 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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**OVERLOAD**

Indicates that the load connected to the voltage converter exceeds the continuous rating.

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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, causing the output voltage to drop to maintain the current at the maximum level.

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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:

The Voltage Converter is located in a poorly ventilated area or the ambient temperature is too high.

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If the voltage converter gets too hot, 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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# Specifications

Input Voltages	-12	-24
Input Volts Actual	10.5 - 14.0 VDC	21 - 28 VDC
Input Amps	50 Amps Max	
Input Fuse - 1/4 x 1 1/4	2 x AGC 30 Amps in parallel	
Noise on Input	< 50 mV	

Output Voltages	-12	-24
Output Volts Actual	(Input – 1V) or 13.5 - 17.0 VDC Whichever is greater	(Input – 1V) or 24.0 - 27.5 VDC Whichever is greater
Output Amps	*45	

\* The actual output current capability depends on the input/output voltage ration. To obtain the actual output current capability use the following formula: Output Amps = Input Volts/Output Volts x 45  
For example, at 11 VDC In and 13.6 VDC Out, the output current = 11/13.6x45=36.4 Amps Max.

Output Overvoltage Protection Crowbar	Programmed Output x 1.3 Volts
Low Output Voltage Alarm	Programmed Output x 0.75 Volts
Ripple and Noise	< 100 mV Peak to Peak
Transient Response	< 1V for 50% Step Load
Regulation (Line and Load)	< +/- 0.5%
Efficiency	> 90% @ Maximum Output

<b>Mechanical</b>	
Dimensions	9.1 in / 23.1 cm Long x 7.8 in/ 19.8 cm Wide x 4.3" / 10.9 cm High
Clearance	1.0 in / 2.5 cm all around
Weight	6.0 lb / 2.7 kg
Material and Finish	Marine Grade Black Anodized Aluminum with 18-8 Stainless Fasteners
Mounting	Wall or Shelf Mount
Connections	Input: Flying Leads – Red & Black, 4 ft / 1.25 m length, 2 x 10 AWG Output: Beau 4 position terminal block, 2 positive, 2 negative

<b>Environmental and Safety</b>	
Operating Temperature Range	-25°C to +40°C @ maximum output. Derate Linearly 2.5% per °C from 40°C (Optional -40 to +55 °C wide temperature operation available)
Humidity	0 - 95% Relative Humidity (non-condensing) with standard conformal coating
Emissions	Meets FCC Part 15, Class B
Isolation	Input-Output Common Negative, Input-Case and Output-Case 500 VDC
Audible Noise	None, Convection Cooled
Typical Service Life	> 10 years (87,600 hrs)
Warranty	Three years parts and labor
Safety	Built to meet CSA 22.2.107.1 & UL458