



# ANALYTIC SYSTEMS

Power Conversion Solutions

## INSTALLATION & OPERATION MANUAL

### BCD305 SERIES DC Battery Charger



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

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**ANALYTIC SYSTEMS**  
Power Conversion Solutions

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# IMPORTANT & SAFETY INSTRUCTIONS

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

## ALL BATTERY CHARGERS

1. CAUTION — To reduce risk of injury, charge only lead acid or sealed gel cell type rechargeable batteries. Other types of batteries may burst causing personal injury and damage.
2. Do not expose battery charger to rain or snow.
3. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
4. Do not disassemble battery charger; take it to a qualified serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
5. To reduce risk of electric shock, disconnect battery charger from batteries and AC supply before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

## DC BATTERY CHARGERS

1. WARNING — RISK OF EXPLOSIVE GASES.
  - i. WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE SERVICING EQUIPMENT IN THE VICINITY OF THE BATTERY, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.
  - ii. To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary marking on these products and on the engine
2. PERSONAL PRECAUTIONS
  - i. Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.
  - ii. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
  - iii. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
  - iv. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
  - v. NEVER smoke or allow a spark or flame in vicinity of battery or engine.



- vi. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
- vii. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- viii. NEVER charge a frozen battery.
- ix. If necessary to remove battery from service, always remove grounded terminal from battery first. Make sure all accessories are off, so as not to cause an arc.
- x. Be sure area around battery is well ventilated.
- xi. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- xii. Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.
- xiii. Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow manufacturer's recharging instructions.

### 3. BATTERY CHARGER LOCATION

- i. Never place battery charger directly above battery; gases from battery will corrode and damage converter.
- ii. Never allow battery acid to drip on battery charger when reading gravity or filling battery.

### 4. O/P CONNECTION PRECAUTIONS

Connect and disconnect all DC connections only after setting battery charger switch to off position.

Analytic Systems does not recommend the use of the BCD305 Series Battery Chargers 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), autotransfusion 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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This all new single board design incorporates state of the art switchmode technology for unmatched efficiency and ultra-quiet operation. Multiple stages of filtering reduce radiated or conducted noise to very low levels. Extra features include adjustable output voltage, audible and visual indicators for low input voltage, low output voltage and over temperature. Safety features include reverse input protection, over-temperature shutdown, current limiting, short circuit protection with automatic recovery, input undervoltage shutdown, reverse battery protection and output overvoltage crowbar. Optional features include a dry contact alarm relay output, and remote panel monitoring with On/Off control.

We are confident that you will get many years of reliable service from this DC Battery Charger.



# Specifications

Model	BCD305-12-12	BCD305-12-24
Input Volts (DC)	10.5 - 14	10.5 - 28
Input Amps (max)	30	30
Output Volts (DC)	13.6 ± 0.5 V	27.2 ± 0.5 V
Charging Amps	*26	*13
Output Crowbar	Output Volts x (1.3 ± 1%)	
Input Fuses	AGC-20 x 2	
Output Fuse	AGC-30 x 2	
Low Input Voltage Alarm	10.5 VDC	
Low Output Voltage Alarm	Output Voltage minus 2.5 VDC	
Battery Banks	2	
Stages	2	
Battery Size (Amp Hours)*	104 – 156	52 - 78
Transient Resp.	< 1V for 15A Surge	
Efficiency	> 85 % @ maximum output	
Temp. Range	-25 to +40 deg° C @ maximum output	
Isolation	Any Input or Output to Case 500VDC Input to Output Common Negative	
Length	9.1 in / 23.1 cm	
Width	7.8 in / 19.8 cm	
Height	2.5 in / 6.4 cm	
Clearance	1 Inch (2.5 cm) all around	
Material	Marine Grade Aluminum	
Finish	Black Anodized	
Fastenings	18-8 Stainless	
Weight	4.0 lb / 1.8 kg.	

\*The Actual charging rate depends upon the input/output voltage ratio. To obtain the charging capacity at any given input voltage, use the following formula: Charging Current = Input Volts/Output Volts x 26

For example, at 10.5VDC in and 13.6VDC out, the charging current = 10.5/13.6 x 26 = 20.1 amps

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 1 inch of clearance for adequate cooling.

## POWER CONNECTION

The unit is supplied with input power leads 1 meter long. This should normally be adequate to connect to a source of power. If you must extend the cable:

- Use the smallest extension length possible.
- Use no less than 10 gauge conductors.
- Splice and solder the joints.
- Protect the joints with heat shrink tubing.

Connect the wires as follows:

- Red to Positive
- Black to Negative

## POWER CONNECTION

Two positive output terminals and two negative output terminals are provided. Connect only one wire to each terminal.

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:

Output Current = Input Volts / Output Volts x 26

For example:

10 VDC in and 27 VDC out, the max output current =  $10/27 \times 26 = 9.6$  Amps.

20 VDC in and 27 VDC out, the max output current =  $20/27 \times 26 = 19.3$  Amps

It is recommended to parallel the output connections if the unit is used as a single bank battery charger.



## Operation

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Turn the power switch on the front of the unit on to energize the outputs.

If you wish to adjust the output voltage, first attach a good digital voltmeter to the output terminals to monitor the voltage. Next, 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. Remove the voltmeter from the output terminals.

## Troubleshooting

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If the load exceeds the continuous rating for too long a period, the internal temperature sensor will cause the unit to stop boosting the input voltage until the unit has cooled down. After the unit has cooled down, normal operation will resume.

If the input voltage drops below the specified minimum input, the unit will sound the alarm.

If the output voltage drops below the specified minimum, the unit will sound the alarm.

If the current demanded by the devices connected to the unit exceed the maximum current rating, the fuse will blow.

If the fuse blows with no load connected, check that the power leads are connected to the battery with the correct polarity; if they are then the unit is damaged and must be returned for repair.





## Dry Contact Relay

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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 7 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 J11. J11 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 batteries. Next, turn the unit on for 30 seconds to discharge the capacitors, and then turn it off again. Remove the six screws holding on the cover, turn the unit upside down, remove the cover and locate J11. 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 four screws. Reconnect the unit to the power and batteries.

## Remote Control Option



A remote control panel may be connected to the converter using a 9-pin D-connector, which attaches to the side of the battery charger. 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.

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

### 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 battery charger 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.

## Special Services & Options

<b>Conformal Coating</b>	INCLUDED ON ALL UNITS UNLESS REQUESTED NOT TO as of April 1, 2014
<b>Option "c"</b>	Ruggedization Package (EXTRA Conformal Coating and RTV Compound)
<b>Option "v"</b>	Marine / Industrial Pkg (EXTRA Conformal dipping and RTV Compound)
<b>Option "MS"</b>	Military Pkg (incl. Wide Temp Components, Conformal Dipping and RTV Compound)
<b>Option "w"</b>	Wide Temperature Operation (-40 to +55 C, incl)
<b>Option "SM"</b>	High Voltage Protection on the DC Input Side
<b>Option "d"</b>	Paralleling Diodes
<b>Option "FI"</b>	Forklift Modifications
<b>Option "F"</b>	Open Frame - No chassis just heat sink bars (not for all products)
<b>Special Input</b>	There is no charge for nominal output voltages (ie. 12.0, 24.0, 48.0), but this must be noted at the time of order (Contact Factory for details)
<b>Special Output</b>	There is no charge for nominal output voltages (ie. 12.0, 24.0, 48.0), but this must be noted at the time of order (Contact Factory for details)
<b>Water tight options</b>	IP66, IPS67, IPS68



## 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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