

# **ANALYTIC SYSTEMS**

Power Conversion Solutions

## **INSTALLATION & OPERATION MANUAL**

### **BCD600 SERIES DC Battery Charger**



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

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Revised - May 19, 2016



# **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 or other DC supply before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

## **GENERAL WARNING**

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 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 in the vessels 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 battery charger.
- ii. Never allow battery acid to drip on battery charger when reading gravity or filling battery.

### 4. DC 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 BCD600 Series DC 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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The 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, over temperature and charging. Safety features include reverse input protection, over-temperature shutdown, current limiting, short circuit shutdown, and output overvoltage crowbar. Optional features include a dry contact alarm relay output, and remote panel monitoring with On/Off control.

The two stage charging profile charges the batteries at a constant current equal to the maximum continuous output of the unit. When the battery voltages come up to the float voltage that the unit is set to, the current into the batteries will taper off as necessary to maintain the batteries at the float voltage. The unit can be left permanently connected without fear of overcharge or damage to the batteries. The adjustable float voltage feature allows the unit to be used for any type of battery including lead acid and gel cell.

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



# Specifications

Model	BCD600-32-12	BCD600-32-24
Input Volts (DC)	20 - 45	30 - 45
Input Amps	40	40
Output Volts (DC)	13.6 ± 0.5 VDC	27.2 ± 0.5 VDC
Charging Current	50 Amps	38 Amps
Output Crowbar	16.0 ± 0.5 V	32.0 ± 1.0 V
Battery Banks	1	
Stages	2	
Battery Size (Amp Hours)*	200 - 300	152 - 228
Input Fuses	AGC 25 Amp x 2	AGC 25 Amp x 2
Output Fuses	AGC 30 Amp x 2	AGC 25 Amp x 2
Transient Response	< 1V for 15A Surge	
Efficiency	> 85 % @ maximum output	
Temperature 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	4.3 in / 10.8 cm	
Clearance	1 Inch (2.5 cm) all around	
Material	Marine Grade Aluminum	
Finish	Black Powder Epoxy	
Fastenings	18-8 Stainless	
Weight	4.0 lb / 1.8 kg	

\* Specifications subjects to change without notice.

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

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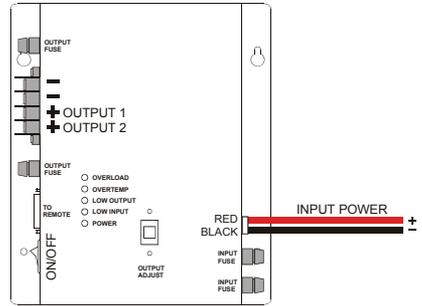
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# Installation

Allow at least 1 inch of clearance all around the case for cooling. The best mounting configuration is to mount the unit on a vertical surface oriented as shown. Use #10 screws of the appropriate type for the mounting surface to securely mount the unit.

The case has 500 volts of isolation from both the input and output, so it may be mounted on any surface without fear of electrolysis or ground fault.

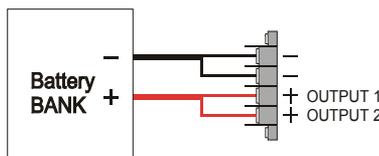


The unit is supplied with 1 metre (3 feet) of #10 AWG wire. This should be adequate to connect to a breaker panel or other source of power. If you need to extend the wires, use at least #10 AWG wire and solder and heat shrink the connection to protect the joint. Connect the Red wire to Positive, and the Black wire to Negative. If the unit is being run from a 24V battery system, use a 30 amp panel breaker to feed power to it, and use a 20 amp panel breaker for a 32V battery system. Each BCD600 Series battery charger should have its own breaker in the panel.

To reduce radio noise to the absolute minimum, it may be necessary to bond the case to the vessel ground. To do this, remove one of the screws that mounts the output terminal strip to the chassis. Then place a #6 ring terminal with a ground wire crimped to it under the screw head, and replace the screw.

The charging battery bank may be wired directly to the output terminals of the unit, or the unit can be wired to a distribution panel if it is more convenient. It is recommended to keep all wiring as short as possible to keep the line losses to a minimum.

Each output terminal can supply up to 25 Amps, therefore 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, do the following: The output terminals must be connected to the load in parallel ensuring that the wiring used has sufficient capacity to handle the current.





## Operation

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To turn the unit on, simply move the power switch to the ON position. The alarm buzzer will sound and the Low Input LED will come on briefly, and then the green Output ON LED will illuminate. 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.

Connect only one bank of batteries to the unit. Connect the '+' outputs of the unit to the positive lead of the battery bank. Connect the '-' outputs of the unit to the negative lead of the battery bank. The '+' outputs are electrically common and have output isolation diodes to prevent damage to the unit if the battery bank is accidentally connected backwards. The '-' outputs are electrically common. If you accidentally connect a battery in reverse, the output fuse (AGC 30) will blow. If this happens, correct the connection of the battery, confirm it with a voltmeter, and then replace the fuse.

When the unit is first turned on, it will charge the batteries at a constant current of 50 amps for a -12 model and 38 amps for a -24 model. During this time, the red 'Charging' LED will be on. If the batteries are seriously discharged, the 'Low Output' LED and the audible alarm will also come on. After a period of time, which may be minutes to hours, the batteries will reach the float voltage, and the charging current will reduce as necessary to maintain the batteries at that voltage. Once this happens, the red 'Charging' LED will go off. You may now check the float voltage at the output terminals of the unit with a good digital voltmeter. As shipped from the factory, the unit is preset to 13.6 volts, which is generally recommended for lead-acid batteries. The generally recommended voltage for gel type batteries is 13.9 volts. Your battery supplier may also recommend a different voltage. If you need to adjust the float voltage, refer to the section above for the correct procedure.

## Troubleshooting

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If the red Over-temperature LED and the audible alarm come on, the unit has overheated, and it will shut down until it cools off sufficiently. You may not have allowed sufficient space around the unit for cooling, or there may be too many devices connected to the output of the unit. Either reduce the number of devices connected to the unit, or reposition the unit for better cooling. If necessary, direct a stream of moving air over the unit.

If the yellow Low Input LED comes on, the input voltage has dropped below 19 VDC (27 VDC on the -24 version). To keep from completely discharging the batteries (if the battery charger is being operated from batteries), the unit will shut down until the voltage recovers to 21 VDC (29 VDC on the -24 version). Make sure that the charging system is operating properly, and that the wires connecting the input voltage to the unit are not corroded or damaged.



If the red Charging LED, the Low Output LED and the audible alarm come on, and the green Output On LED is completely off, the output of the unit has been shorted out, or there has been an internal failure. Turn the unit off, disconnect the battery bank connected to it, and turn it back on again. If it comes on normally, then the battery bank or output connections have a short. You must rectify the cause of the fault before reconnecting the battery bank. If the condition still exists after the battery bank has been disconnected, the unit is defective, and must be returned to the factory or an authorized service center for repair.

If the unit will not turn on at all, check the input fuse. If it is blown, replace it with a new one. If that fuse blows as well or the unit still will not turn on, it is defective, and must be returned to the factory or an authorized service center for repair.

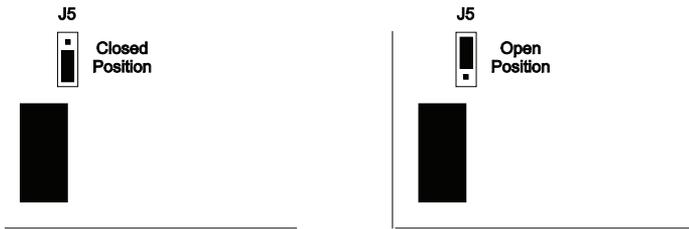
If the green 'Output On' LED is on, but there is no voltage at the output terminals, check the output fuses. If they are blown, replace them with AGC 30A fuses. If there is still no voltage at the terminals, the unit is defective, and must be returned to the factory or an authorized service center for 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 8 in the remote control diagram.

The relay is factory preset to fail in the closed position when the low output LED and buzzer

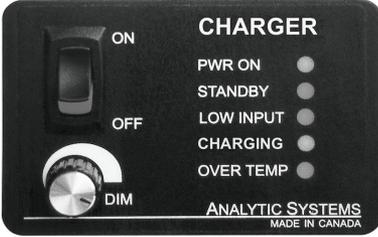


come on. If you wish to have the relay fail in the open position when the low output LED and buzzer come on, you must take the cover off the unit and move the jumper to the other position on J5. J5 is located next to the relay. To change the position of the jumper, first turn the unit off and disconnect the unit from both the power and batteries. Next, turn the unit on for 30 seconds to discharge the capacitors, then turn it off again. Turn the unit upside down and remove the four screws. Remove the cover and locate J5. 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

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A remote control panel may be connected to the battery charger using a 9-pin D-connector that 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.



## 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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