

POWER CONVERSION SOLUTIONS

GUIDE

VOLTAGE CONVERTERS
SOLAR CHARGE CONTROLLERS
AC INVERTERS
BATTERY CHARGERS
POWER SUPPLIES
FREQUENCY CONVERTERS



From the President...



August 2009

Welcome to our 2010 catalog. So many things have happened since we last published a catalog that it is difficult to list them all. Most important is that we were able to move to a 33,000 square foot facility that was custom designed for electronics manufacturing. I have to congratulate our team for their hard work in preparation and planning for the move. We closed for business in our Surrey location at 4:30pm on Thursday March 19th, and were open in the new Delta facility at 8am on Tuesday March 24th, a great achievement! Since then we have continued to make changes and improvements to allow us to better serve you now and into the future. Any customer who would like to visit our new facility is more than welcome anytime!

On a sad note, my father Lloyd Hargrove who founded Analytic Systems in 1976 passed away on Monday March 16th, 2009, just a few days before the move. We have dedicated our new building to his memory, and will work very hard to continue and enhance his legacy.

We have created a 'Technical Services Group' that consists of a number of engineers and technicians whose primary focus is to support both our customers and our manufacturing division as well as improving the linkage between R&D and manufacturing. This will allow our R&D Engineers to focus more fully on new development work while at the same time improving the transfer of information from them to manufacturing.

We have also expanded our R&D engineering team as the number of customers requesting custom engineered power solutions keeps growing. This will allow us to meet our customers' needs while also designing new products for our standard product lines. We are working on power conversion solutions for the alternate energy sector, and I am personally very interested in the all electric vehicle for pollution free urban transportation.

As I have discussed in previous letters, we continue to focus on enhancing our Q-Base quality management system and remain dedicated to Lean Manufacturing to reduce raw material inventory and decrease customer response times. Since beginning these initiatives, our quality has improved and our on-time delivery has reached nearly 100 percent!

Thank you again for your interest in Analytic Systems. We will continue to work to earn your business by delivering high quality Power Conversion products on time!

Yours truly,
Jim Hargrove P.Eng

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Wherever Power Conversion Is Needed

Visit www.analyticsystems.com today!

Be sure to visit our website (www.analyticsystems.com) to view all of the information provided in this catalog and more!

Watch our new IMPACT MOVIE at
www.analyticsystems.com/angelvision/index.html.
This short movie is an excellent introduction to Analytic Systems.



1. History

Founded in 1976 by Lloyd Hargrove, P.Eng., control of Analytic Systems passed to his son, Jim Hargrove, P.Eng. in 1993. The company was one of the first to develop high frequency switching converters for marine applications (in 1976), and offered pure sine-wave inverters in 1994, years ahead of the competition. Through the years, Analytic Systems has seen steady growth by serving its customers with reliable and robust power conversion products. Analytic Systems' ongoing R&D programs create innovative, state-of-the-art electronic designs that provide clean outputs in efficient and compact packages.

2. Our Products

Analytic Systems designs and manufactures a full line of power conversion products including:

- MPPT Solar Charge Controller
- DC-DC Voltage Converters
- DC-AC Power Inverters
- AC-DC Power Supplies
- AC-AC Frequency Converters
- DC & AC Source Battery Chargers
- Configurable, OEM and Custom Power Solutions

3. Competitive Advantage

- Access to some of the most gifted designers of electronic circuitry who are capable of turning your ideas into solutions.
- Three year warranty on in-house standard products
- In the area of power conversion products, we are widely regarded as one of the most versatile and responsive companies in the industry
- The ability to turn market intelligence and feedback from our customers into successful new development projects
- The high standards of our operational personnel in providing the highest quality product available
- Rugged and reliable products, built-to-last, with a 10-year life span
- Customer support expertise
- Speedy turn around on product design; backed up with excellent service
- Available sales/service staff to field all business opportunities and customer inquiries

4. Manufacturing & Quality



At Analytic Systems we know that the reliability of our products depends not only on the quality of the design and manufacture, but also on the quality of service back-up that we provide to our customers. Our wholly owned manufacturing site practices the latest quality management techniques, including the Q-Base Quality Management System and Lean Manufacturing. Our units are also designed to meet and exceed many of the latest international testing standards (ie. CSA/UL, CE) showing Analytic Systems is committed to Quality, Service, Support and Safety.

5. Applications

The Analytic Systems' name is found in many different applications, including:

- **Alternative Energy**
PureSine Inverters & MPPT Solar Charge Controllers
- **Military**
Power Supplies, pure sine inverters, battery chargers
- **Industrial & Manufacturing Plants**
Converters, Power Supplies, Battery Chargers
- **Telecommunications Systems**
48-volt Inverters, Converters, Battery Chargers
- **Heavy-Duty Trucking**
12V Inverters
- **Commercial Marine**
Battery Chargers, Inverters, Converters and Frequency Converters
- **Programmable Logic Controllers**
Converters, Power Supplies
- **Railway Train Tracking**
Solar Panel-powered Battery Chargers
- **Electric Forklifts**
Converters and Inverters for computers
- **Mining Equipment**
250 VDC Inverters and DC-DC Converters
- **Heavy Industrial Equipment**
12 to 24-volt Step-up Voltage Converters
- **Power Generating Stations**
125 VDC Converters & Inverters
- **Race Teams**
In-car converters, Track-side Inverters, 12 and 16 volt Battery Chargers

6. Markets Served

Our products are found throughout the following industries:

- Military
- Solar & Alternative Energy
- Industrial
- Commercial Marine
- Heavy Equipment
- Communications
- Materials Handling & Forklifts
- Fleet Utility
- Automotive & Motorsports

7. End Users

Our end users include some of the most demanding organizations in the world; a small sample is included below:

- AAI Corp.
- AEE Solar
- BAE Systems
- BC Hydro
- Bell Canada
- Boeing Corp
- Canadian National Railways (CNR)
- Carmanah Technologies
- CMC Electronics
- Coast Mountain Bus (BC Transit)
- General Dynamics-OTS
- NASA
- Northrop Grumman
- Qualcomm
- Raymarine
- Raytheon
- Solar Turbines
- SunWize Technologies
- Syracuse Research
- Teleflex Energy
- Telephonics
- US Military
- US Steel
- Woods Hole Oceanographic Institute

A MILITARY PRODUCTS - COMMERCIAL-OFF-THE-SHELF (COTS)

Most of the products manufactured by Analytic Systems can be adapted for military use (Commercial Off The Shelf). We provide four different levels of ruggedization; most often, a product in military use is equipped with extra-wide temperature range components to allow for operation from -40 degrees C up to +55 degrees C. The printed circuit boards are also protected against condensation and are enhanced with vibration protection that meet or exceed MIL-STD-810D, Method 514-3 and Cat-I Proc I. IP67MS was achieved on a series of battery chargers and power supplies this year. COTS products are built to meet water tightness MIL-PRF 44485 and EMC radiated and conducted emissions MIL-STD-461E. All COTS products are manufactured in accordance with IPC-A-610.

1. Power Supplies

Analytic Systems can also produce specific products for military use. We currently manufacture the Power Supply and the Portable Battery Pack for the US Army MBU Field Kitchen Program and the PWS1510 was specifically designed for the US Army's Portable Radar Unit and Telephonics Radar (Moroccan military and SBINET).

The MBU Power Supply operates from any 110-volt AC source and produces enough power to operate a military cookstove. Producing 26-volts DC and 24 amps continuous, at up to 50 degrees C, and with a peak current of 45 amps, the MBU Power Supply meets MIL-STD-810D, Method 514-3 and Cat-I Proc I for vibration, and MIL-STD-461E for both radiated and conducted noise. This unit can also withstand rainfall at 4 inches per hour. SPAWAR uses the PWS610R-220-12 and the 220-48 Power Supplies. The LIAC600-28 was developed from the MBU power supply. It is used as a combination Li-Ion battery charger/power supply for a US army weapons system.

3. Battery Chargers

The MBU Portable Battery Pack produces a regulated 26 volts for running MBU cookstoves in the absence of AC power from a pair of sealed VRLA (valve-regulated lead acid) batteries. When the batteries need recharging, the Battery Pack is plugged into the auxiliary 24-volt power outlet on a HMMWV and recharges the batteries using a 3-stage temperature compensated charging algorithm. The MBU also passes the MIL-STD-810D, Method 514-3 and Cat-I Proc I test for vibration. Our LIDC600 was developed as the basis for the new VMC (Vehicle mounted charger) for the US Army.

2. DC Converters / AC Inverters / Frequency Converters

Analytic Systems has supplied DC-DC Voltage Converters, DC-AC Inverters, AC-DC Power Supplies, as well as all types of battery chargers to almost every branch of the US Military and Coast Guard. The US Navy uses the VTC615-24-24 Voltage Converter and the US Army, in addition to the MBU Power Supply, uses customized versions of the PWS1502-110-24 and VTC615-24-24 in various operations. NAVAIR uses the IPS600-12-110 and IPS1000-20-110 Pure Sinewave Inverters, and the Canadian Coast Guard uses the VTC615 to supply clean power to their gyroscopes.

4. Custom Power Requirements

Analytic Systems also offers custom-engineered power solutions up to 12 kW. Working closely with our customers, we can help you to better understand and define your power conversion requirements.

We also offer full life-cycle support for all our products, including ongoing maintenance and repair services. We have a tradition of maintaining long-term relationships with our customers who continue to rely on our technical, manufacturing and project management expertise.

Military spec sheets available online. Please visit: www.analyticsystems.com

*I really appreciate this!
Working with your company
has been wonderful. Everyone has
been so helpful and professional.
Thanks again!!!!*

Rose Burke
LMCO



B MARINE PRODUCTS - COMMERCIAL & RECREATIONAL

The Commercial Marine Market, which includes fishing, towing and deep sea vessels, values rugged construction, reliability and low-EMI operation, that does not interfere with the sensitive communications equipment typically found on board. Analytic Systems was founded in 1976 specifically to design and build power conversion products for this market. Every new product developed in the intervening years has been true to this hallmark. Our solutions have been used and endorsed by companies such as Raymarine, Kobelt, Simrad and Sea Ark Marine.

1. DC Voltage Converters & Conditioners

In 1976, Analytic Systems started building voltage converters that could run a 150-watt, single side-band radio from a 32-volt battery system without the need of a 12-volt battery. Our line has expanded to include 32V to 12V and 24V to 12V Step-down Converters with up to 50 amps of output, 12V to 24V Step-up Converters to run 24V radar scanners from 12V batteries, as well as a full line of fully isolated Power Conditioners to provide clean DC power.

3. Battery Chargers

Analytic Systems sets the standard in low-ripple battery charging. 12, 24 and 32-volt Battery Banks (up to 3 banks per charger), up to 1000 AH, can be charged using 300, 600, 1000 or 1250-watt chargers. Bright red LED volt and ammeters show battery condition from across the engine room. Additionally, 12-volt emergency batteries can be charged from any on-board AC or 24V DC source with our DC source Battery Chargers.

2. Battery Equalizers & Power Supplies

Up to 50 amps of 12 VDC power can be drawn from the low side batteries in a 24-volt bank when using Analytic Systems' BCD301 or BCD601 Battery Equalizers to maintain battery balance.

Analytic Systems' Power Supplies can deliver a precision regulated 12V or 24V of ultra-clean DC power to run a full range of sensitive marine electronics. Power outputs are available from 10A all the way up to 100A.

4. AC Inverters & Frequency Converters

Analytic Systems offered the first pure-sine wave inverters in 1994 specifically for running navigation computers. Our line has grown over the years to include quasi-sine and pure-sine inverters at power levels from 300 to 5000 watts. Applications range from running wheelhouse computers to power tools and microwave ovens.

We also offer a full line of industrial-grade AC/AC Frequency Converters for vessels that travel between North America and Europe or Asia.



*Wow! Nice and concise, clear, easy to understand and FAST! WHO ARE YOU? Trying to show up the poor average JOE, well you did it and the poor average JILL too. Gotta love it...
Thanks*

Barbara
Blue Water Ships Store

C TELECOM PRODUCTS

Analytic Systems manufactures a wide range of products useful in the Telecom Sector. They include Battery Chargers (from AC or DC sources), DC-DC Voltage Converters (fully-isolated for use on positive or negative ground systems) and DC-AC Inverters.

1. Battery Chargers (Rectifiers)

Battery Chargers are available for 12, 24 or 48-VDC battery systems. Power levels are 300, 600 or 1000 watts. Source voltages include 110 or 220 VAC, 12, 24, 48, 110 or 250 VDC. Charging profiles are selectable between 2 and 3-stage, and include manually initiated equalize. Temperature compensation is standard. The 300-watt models (BCA310 & BCD310) are wall-mountable but can be mounted on a 19" rack plate if needed. The 600 and 1000-watt models (BCA610, BCA1000, BCA1503, BCD610 & BCD1000) are available as wallmount or rackmount units. The type of mounting must be specified at the time of ordering. Digital metering of charging volts and charging amps is standard on the rackmount models, and optional on all wallmount models. Analytic Systems is offering 5 new DC chargers this year: BCD60, BCD180, BCD250, BCD800 & BCD1503.

3. Voltage Converters

A wide range of DC-DC Voltage Converters are available. Common negative step-down models range from 60 to 600 watts. Common negative step-up models range from 120 to 600 watts. Fully-isolated models are available in 5 and 7 amps (VTC120i & VTC120ih Series), as well as 600 and 1000 watts (VTC610, 615, 1000 or 1015 Series). The VTC610, 615, 1000 and 1015 Series are also available in rackmount that come standard with digital volt and amp displays, and amp displays. New this year are the VTC120-24-12 & VTC1503 (100VDC up to 360VDC in parts).

2. Power Supplies

Power Supplies from 110 or 220 VAC are available in 120, 240, 300, 600, 1000 and 1500 watts. The 120, 240 and 300-watt models are available in wallmount only. Digital Voltage and Current Displays are optional for the 300, 600 and 1000-watt models. The 600 and 1000-watt models are available in wall or rackmount and include the digital displays as standard, the other models can be mounted on 19" rack plate if needed.

4. Telecom Quality Inverters

In addition to quality of workmanship, this concept indicates that our inverters comply fully with EMI requirements for EN 55022 Class B with a significant dB margin. The audio frequency range noise (C-message) on the input is also very low.

Analytic Systems' Inverters have a multi-stage filter on the input and output, and have large hold-up capacitors on the internal 200 VDC or 400 VDC rail for complete elimination of the 60 Hz ripple on the inverter input.

By comparison, many commercially available inverters are not suitable for telecom applications. They typically have no input filters or hold-up capacitors and the input current appears as half sine-waves rather than a smooth DC. The input on these inverters is usually also loaded with switching frequency noise. Such inverters rely on the proximity of the battery.

The above factors should always be taken into account when comparing prices.

I like what your company is doing; I'm very impressed with your responsiveness.

K.Farmer
L-3 Communications
Albuquerque, NM



D INDUSTRIAL, UTILITIES & MOBILE EQUIPMENT PRODUCTS

Many of the products produced by Analytic Systems are used in Utility and Industrial environments. A common Utility voltage is 110 volts DC. However, power is required at 24 VDC for SCADA or PLC applications. We produce a series of fully isolated DC-DC voltage converters that convert 110 VDC (90 - 140 VDC actual) to a fully regulated 27.2 VDC at 300, 600, 1000 and 1500 watts. When provided with the optional paralleling diodes, multiple units can be run in parallel for additional power or redundancy. If the application calls for batteries at the 24 VDC level, we also manufacture DC-DC battery chargers at 300, 600, 1000 and 1500 watts.

1. DC-DC Converters and Chargers

Our DC-DC Voltage Converters are also widely used in industrial applications, ranging from steel mills to factory and distribution warehouses. Again, voltage converters that convert 110 or 250 VDC or other required voltages from 12 to 24 volts DC for control or communications are common applications.

Steel mills, and other heavy industry applications are difficult because the source voltage is very dirty, with many spikes and voltage reversal on the input side. Over years of practical experience, we have developed converters that are capable of surviving and providing years of reliable service, even in such rough environments, with special ruggedization options.

2. Forklift Power Supplies

We are often called upon to supply fully isolated DC-DC converters to produce 15 -16 volts DC, at 5 to 7 amps from forklifts, 36 or 48 volts DC to run notebook computers. These are particularly tough applications as the thyristor-based motor drives for the forks and tires produce large amounts of overlying AC on the batteries and will cause many converters to fail unless proper input-circuitry is used. We call this the 'Forklift' Modification ("fl").

If your application is for any system where such motor drives are used on the source voltage side, let us know so we can make the proper modifications.

3. AC Inverters

Often AC power is needed for running computers or other specialty equipment in industrial applications. The IPS and IVS Series of pure sine-wave inverters are available from 100 to 5000 watts to meet these needs. Input voltages include: 12, 24, 48, 72, 125 or 250 volts DC.

The same design and construction principles that have made Analytic Systems a respected name in commercial marine power also apply to Utility and Industrial applications. Our all-aluminum, anodized or powder-coated construction, using only 18-8 stainless fasteners, make our products rugged and durable. Contact us with your specific requirements for a quote or proposal.

Product Feature FBCS-2K Forklift Battery Charging System



Built for industrial plant and harsh shop environments, the **FBCS-2K Forklift Battery Charging System** provides up to 2000W to charge a 12, 24, 36 or 48V battery system from a 110 or 220 VAC source. This unit can also function as a power supply if set to 2-stage charging.

Constructed using state-of-the-art switchmode technology and supplied in a fully 'CSA Safety Certified' box, these rugged and reliable units will provide years of trouble-free operation.

SOLAR & ALTERNATIVE ENERGY

SolarMax & Alternative Energy Products

Alternative Energy encompasses many non-traditional methods of generating electricity. These include solar - the most well known - wind, water and more. The problem with these types of energy generation is that their output is not constant. Solar panel outputs vary by time of year, weather and time of day. Wind generator outputs vary directly with the strength and direction of the wind, and water generator outputs vary with the head (pressure) and flow available.

To make any of these sources of energy useable involves some form of storage and energy conversion. Analytic Systems can provide products to use the output from any of these sources to charge storage batteries (DC and AC Source Battery Chargers), as well as products to convert the output of the batteries to the required power at the load, including both DC-DC Converters and DC-AC Inverters.

Designed for the rugged-duty demands of heavy-duty industrial markets, our reliable and robust products will provide years of trouble-free service for alternative energy users and manufacturers.



Some examples of the Solar & Alternative Energy products we design and manufacture include:

1. Battery Chargers

Battery banks from 12 to 48 VDC and up to 1000 AH can be charged using 300, 600, 1000 or 1500-watt chargers from any AC or DC source, up to 250 VAC or 360 VDC.

A new feature that we have developed allows for an AC/DC input solar charger. If your nominal string voltages are within the 90-130VDC range, using the above input setting modifications and an internal relay switch, our BCD chargers can be made to also accept a standard 110VAC input. This feature allows you to use one charging unit to handle both solar and AC sources. Great for mobile chargers on electric vehicles and mobile command stations.

2. Voltage Converters

The voltage from battery banks can be converted up or down at power levels from 60 to 1500 watts, with or without electrical isolation, from a wide variety of models. A number of our Class 1, Div 2, 24 to 12-volt Voltage Converters are used throughout the Oil & Gas Industry for Off-Grid SCADA applications.

3. Inverters

The voltage from battery banks of 12 to 270 VDC can be converted to pure-sine AC at power levels from 100 to 5,000 watts, depending on the model series.

4. SolarMax, MPPT Charge Controller & Inverter Charger

New for 2009, Analytic Systems is proud to introduce our state-of-the-art 100A True MPPT Charge Controller and 'Easy Install' 2500W Inverter Charger. Please contact us for the latest specifications and release dates.

5. Custom Requirements

Analytic Systems will take on custom design projects. An example of one such project was our Solar Battery Charger, SNC-10. Custom-built for Canadian National Railways (CNR), it converts the output from a 6 or 12-volt, nominal solar panel to 1.5 or 3.0 VDC to charge high-capacity Ni-Cad batteries, at up to 15 amps, and meets the stringent requirements for mounting directly adjacent to railway tracks in any ambient temperature. We are also designing a custom charge controller for BC Hydro for mountain top repeaters.

*Race proven by the 2006 N Pac GTL Champions.
Visit www.raceenergy.net for cutting-edge, state-of-the-art motorsports and vintage car power conversion solutions.*

"It is essential that a vehicle's electrical demands, especially for fuel, cooling and ignition are well met. The power supply needs to be reliable, constant and totally consistent. This is really true in drag racing where consistency wins. I've seen other solutions to the problem that are downright cumbersome... This (TDC305) is a good quality product that solves the needs of many different kinds of racing."

Con Dunphy
Atlantic Electronics Ltd.
Mount Pearl, NF



DC/DC VOLTAGE CONVERTERS

Introducing NEW VTC120-24-12 & VTC1503 Series

Analytic Systems first designed DC Voltage Converters in 1976. From the very beginning, the company has been committed to meeting the standards for reliability needed for uses in marine, military, industrial and heavy equipment environments. These modern designs use efficient filtering, giving ultra-quiet operation. The cases are made from marine-grade aluminum extrusions or heavy-gauge aluminum sheet metal; powder coating or anodizing and stainless fittings are used throughout. The circuit boards are uniquely robust using expensive heavy-gauge copper conductors, designed by Analytic Systems' engineers and assembled in our plant. Models are available to step-up, step-down, stabilize or isolate DC power over a range of 12 to 360 volts. These easy-to-install units will give you many years of long life.

1. High Performance

Analytic Systems' DC/DC Voltage Converters are designed to perform in the harshest environments. The units have been designed to cope with 100% continuous duty-cycle loads under wide temperature ranges. Peak currents are also available up to 40% above rated output. Special importance has been placed on voltage regulation, and precision PWM control circuitry ensures that output voltages are constant regardless of the load. Efficiencies of more than 90% across the load range result in greater heat dissipation making the units cool-to-the-touch.

2. Engineered Right the First Time

Analytic Systems' DC/DC Voltage Converters feature heavy-duty construction in high-grade materials. The extensive use of non-corrosive materials ensures the units can withstand harsh marine and industrial environments. The casing is made from heavy-gauge aluminum sheet metal or from extruded marine-grade aluminum. All fasteners and terminals are stainless steel. An optional protective conformal coating is available for humid environments. This use of the highest quality materials gives Analytic Systems' VTC Voltage Converters a typical service life of more than 10 years!

3. Ultra-Quiet, Low EMI Operation

Multiple stages of filtering reduce radiated and conducted noise to very low levels. Output noise levels of far less than 50mV and typical Line-Load regulations of +/- 0.5% allow all units to comply with the current US FCC and European CE Standards for Electromagnetic Compatibility (EMC).

4. Flexible Design

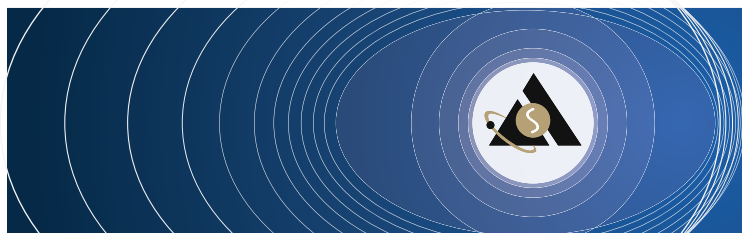
The VTC Series of Step-Up Converters above 300 Watts allow for a +/- 1V output adjustment. This user-friendly design gives the installer the choice of a standard setting for normal operation and a lower voltage setting for more sensitive equipment. As an option, these units can also be built in a 2-stage DC-DC 'Smart' Battery Charger configuration.

5. Built for Safety

In addition to adjustable output voltages, all Analytic Systems' VTC Series DC Converters are fully protected by a range of built-in safety features. All units include reverse input protection, over-temperature shutdown, current limiting, short circuit shutdown, a dry contact output fail relay output and output over-voltage crowbar. Additionally, the 300W and above models include high-visibility, visual and audible indicators to allow the monitoring of low input voltage, low output voltage, over temperature, overload and power ON-OFF.

6. Our Unbeatable Guarantee

Analytic Systems' VTC Series Voltage Converters are manufactured using only quality components and materials. Manufacturing in North America ensures that all standards for product safety and occupational health are met. All standard products are 100% fully tested and burned-in before shipment. Analytic Systems' Voltage Converters are warranted against all failures and faults for a period of 3 years from the date of purchase by the end user (A 2-year Added Extension is also available).



*You da man!
The last set of DC to DC converters were perfect.*

**Al Meyer
Telephonics**

A STEP-DOWN CONVERTERS



VTC60/65



VTC 300/600



VTC180

The VTC60 Series is a 'Step-Down' Converter that converts 24 volts to 12 volts at 5A. They are rugged, reliable, easy-to-use and very economical. They are also ideally suited for Class 1, Div 2 Oil & Gas environments.

The VTC65 and VTC180 Converters are also 'Step-Down' Converters, but can accommodate input voltages from 30 to 100 VDC and have output voltages of 12 or 24 VDC. Applications range from radios to autopilots to almost any type of 12-volt equipment from 32, 36, 48 or 72-volt sources.

The VTC300 and VTC600 Series are also 'Step-Down' Converters, and can accommodate a wider input voltage range of up to 45 volts. This means that they can be used to generate 12 volts from 24, 28, 32 or 36-volt electrical systems. Output currents are higher at 35 to 55 amps. The output voltage is adjustable up or down by 0.5 volts from the factory preset level. Both these series use a switching transistor in parallel with the switching diode in a 'Half-Bridge' arrangement for absolute maximum efficiency. They feature diagnostic LEDs and audible alarm, can be equipped with an output fail relay, and are compatible with the RCP1 Series Remote Control Panel. A VTC300 converter has enough power to run a 150W SSB Radio, including generous allowance for voice peaks.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI Operation
- Cycle-by-cycle Current Limiting
- Output Over-voltage Crowbar
- Reverse Input Protection
- Custom Input/Output Voltages from 8 to 55 DC
- Wide operating Temperature Range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- DC Battery Charging
- Extra-wide Temperature Range (-40°C to +55°C)
- Forklift Upgrade Package
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package
- RCP1-VTL Remote Control Panel (VTC300 & 600 only)

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
VTC60	12, 24	10.5-16, 20-35	5	5, 12	5.0, 13.6
VTC65	24, 32, 48, 72	20-45, 30-45, 40-65, 65-100	5, 2.5	12, 24	13.6, 27.2
VTC180	32, 48, 72	20-45, 30-45, 40-65, 65-100	15, 7.5	12, 24	13.6, 27.2
VTC300	32	20-45, 30-45	25, 20	12, 24	13.6, 27.2
VTC600	32	20-45, 30-45	50, 35	12, 24	13.6, 27.2

* See pages 30-32 for full Product Specification Guides.

B STEP-UP CONVERTERS



VTC120



VTC305



VTC605

The VTC120, VTC305 and VTC605 Series are 'Step-Up' Converters, and can be used to generate 24 volts from 12 volts, or can be used to stabilize a 12 or 24-volt electrical system. Often 12 or 24-volt equipment running from a battery without an alternator will stop functioning long before the battery is exhausted. By using a VTC120, VTC305 or VTC605, the voltage into the equipment can be maintained at the proper level until every amp-hour has been drawn from the battery, extending run time by as much as 100%. Applications include: stepping-up the voltage into an engine ignition for better starting and increased power; 24-volt equipment can easily be powered from a 12-volt source; 12-volt or 24-volt headlights or work lights can be brightened. Both series include a power transistor circuit which turns off the output voltage when the unit is off. The output voltage is adjustable by up to 3.5-volts in 0.5-volts steps using a vibration-proof DIP switch. They also feature diagnostic LEDs and an audible alarm and are compatible with the RCP1 Series Remote Control Panel.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Cycle-by-cycle current limiting
- Output over-voltage crowbar (except VTC 120 unit)
- Reverse input protection
- Dry contact output fail relay (except VTC 120 unit)
- Custom input/output voltages from 8 to 55 DC
- Wide operating temperature range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- RCP1-VTL - Remote Control Panel (VTC305 & 605 only)
- Extra-wide temperature range (-40°C to +55°C)
- DC Battery Charging
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
VTC120	12, 24, 48	11-15, 22-30, 30-40	5	12, 24, 48	12.0, 24.0, 48.0
VTC305	12	10.5-18, 10.5-28	27	12,24	13.5-17, 24-27.5, Or (input-1V) whichever is greater
VTC605	12	10.5-18, 10.5-28	45	12,24	13.5-17, 24-27.5, Or (input-1V) whichever is greater

* See pages 30 - 32 for full product specification guides.

- Actual output current depends on the Input/Output Voltage Ratio = Input Volts / Output Volts x 27 (or 45 for the VTC 605)

C SPECIALTY ISOLATED CONVERTERS



VTC120i



VTC 120i: The Power Problem Solver

The VTC120i Series Converters are unique in their ability to correct power problems. They combine a switching power converter with a linear regulator final-output-stage for the cleanest possible output. The standard model is very popular for running 24-volt Programmable Logic Controllers (PLC) from 12 volts. There are also a number of fully isolated models for solving ground-related problems, running negative ground equipment in a positive ground electrical system, or vice versa, or cleaning up a noisy electrical system. This model is very versatile with input voltages from 10 to 60 VDC in various models, and output voltages from 3.6 to 48 VDC.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Cycle-by-cycle current limiting
- Output over-voltage crowbar
- Reverse input protection
- Short circuit protection
- Custom input/output voltages from 8 to 55 DC
- Wide operating temperature range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Fuel Cell Modification
- Forklift Upgrade Package
- Extra-wide temperature range (-40°C to +55°C)

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
VTC120i	12, 24, 48	11-15, 22-30, 40-60	5	12, 24, 32, 48	12.0, 24.0, 48.0
VTC120ih	12, 24, 48	11-15, 22-30, 33-45	7.5	12, 15.6, 24	12.0, 15.6, 24.0

* See pages 30 - 32 for full product specification guides.

The Input and Output Specifications for this unit are very flexible from 5V to 48VDC. Please contact us if you need a custom input or output voltage to help solve your power problem.

" Thank you for getting back to me with the updated information. We look forward to working with the DC/DC converter. I sincerely appreciate the assistance we have received from Analytic Systems."

Rahul Patel
Minnesota State University

D HIGH-VOLTAGE ISOLATED CONVERTERS



VTC310



VTC610



VTC1000



VTC 1503

The VTC310, VTC610, VTC1000 and VTC1503 Series are the result of several years of intensive research and development. They utilize the latest in current mode switching controllers. Industrial DC input voltages from 100 to 360 volts can be handled by various models, and outputs of 12, 24, 32 and 48 volts are offered. The inputs are fully isolated from the outputs, and both the inputs and outputs are isolated from the chassis. They also feature diagnostic LEDs and an audible alarm and are compatible with the RCP1 Series Remote Control Panel.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Cycle-by-cycle current limiting
- Output over-voltage crowbar (except 120 unit)
- Reverse input protection
- Dry contact output fail relay(except 120 unit)
- Custom input/output voltages from 8 to 55 DC
- Wide operating temperature range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- RCP1-VTL - Remote Control Panel (VTC305 & 605 only)
- Extra-wide temperature range (-40°C to +55°C)
- DC Battery Charging
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
VTC 310	110, 250, 300	100-140, 230-280, 280-360	20, 10,7.5, 5, 3.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
VTC 610	110, 250, 300	100-140, 230-280, 280-360	40, 20, 15,10, 7	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
VTC 1000	110, 250, 300	100-140, 230-280, 280-360	60, 40, 30, 20, 12.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
VTC 1503	110, 250, 300	100-140, 230-280, 280-360	100, 50, 25	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6

* See pages 30 - 32 for full product specification guides.

E LOW- VOLTAGE ISOLATED CONVERTERS



VTC315



VTC615



VTC1015

The VTC315, 615 and 1015 Voltage Converters supply either 12, 24 or 48 VDC from a 24 or 48-VDC power source.

Their 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 0.5 volts above or below the standard output voltage. Devices connected to the converter are protected by an output overvoltage crowbar circuit. Optional features include a Remote Control, a 19" Rackmount version, and/ or a Digital Volt Ammeter to allow monitoring of output current and output voltage.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Cycle-by-cycle current limiting
- Output over-voltage crowbar
- Reverse input protection
- Short circuit protection
- Custom input/output voltages from 8 to 55 DC
- Wide operating temperature range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- RCP1-VTH - Remote Control Panel
- DC Battery Charging
- Digital Volt/Ammeter
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package
- 19" Panel Rackmount (615, 1015)
- Fuel Cell Modification
- Extra-wide temperature range (-40°C to +55°C)
- Low voltage input, 12VDC input
 - BCD315, 615, 1015: 60% lower amp output

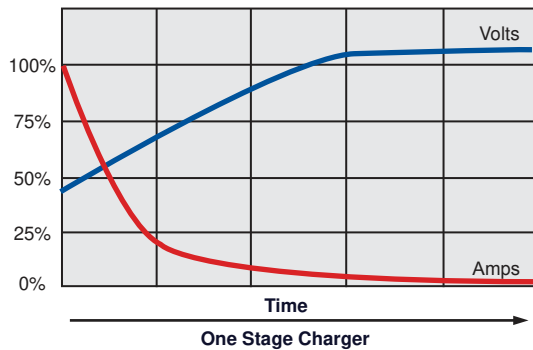
Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
VTC 315	24, 48, 72	20-35, 40-60, 65-90	20, 10, 5	12, 24, 48	13.6, 27.2, 54.4
VTC 615	24, 48, 72	20-35, 40-60, 65-90	40, 20, 10	12, 24, 48	13.6, 27.2, 54.4
VTC 1015	24, 48, 72	20-35, 40-60, 65-90	60, 40, 20	12, 24, 48	13.6, 27.2, 54.4

* See pages 30 - 32 for full product specification guides.

BATTERY CHARGERS

There are many kinds, and capacities of battery chargers. However, there are three major types: One, Two and Three-Stage Chargers.



The ordinary one-stage charger you buy from the local auto-parts store is inexpensive, but it charges slowly and cannot completely recharge a battery to its rated capacity. There are no automatic voltage or current shifts during the charge cycle and without monitoring, overvoltage and water loss can cause premature battery failure.

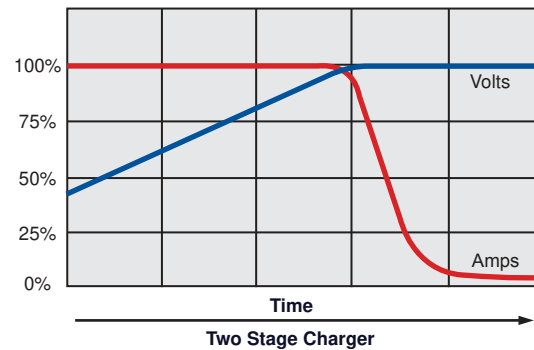
Analytic Systems does not make, nor recommend one-stage chargers because they easily damage the battery by warping its plates or boiling it dry, effectively destroying it. A two or three-stage charger is recommended because both adjust current and voltage according to the battery's requirements.

The choice is between a two or three-stage charger, depending upon its use:

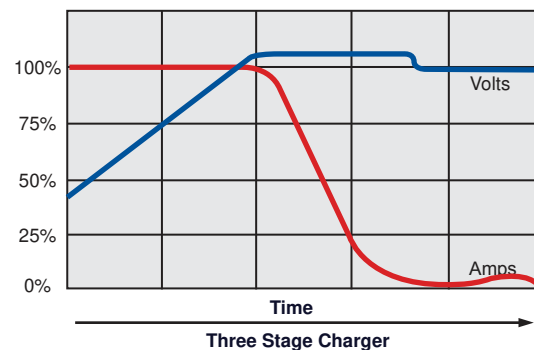
- If there are permanent or transient loads on the battery during charging, a two-stage charger has the advantage because its circuits cannot be 'fooled' into pushing a higher 'absorption' voltage than required for charging.
- Without loads during charging, the three-stage charger has the advantage because it provides a more complete recharge.

"You guys make a hell of a battery charger."

Don Butterbaugh
Harris Corp.



A two-stage charger provides a constant current until the battery reaches its rated capacity and then switches to a 'float' voltage. The current then reduces as necessary to maintain the battery at the float voltage. The charger can be connected to the battery indefinitely. A two-stage charger is recommended in most instances since it is the most versatile and can be permanently connected to attenuate the characteristic discharge of unused batteries. A load can be put on the battery or batteries without altering its ability to keep the battery at optimal charge.



A three-stage charger is the most complete charger. It charges the battery at a constant current until the battery voltage reaches a slightly elevated level. The battery is maintained at this voltage while the charging current diminishes to a low value, and then the battery is switched to the float voltage where it can be maintained indefinitely. However, the charger cannot differentiate between a current going to a load on the battery, or being absorbed by the battery, so it can overcharge a battery supplying current to a load.

A two-stage charger is preferred for 'loaded' batteries and a three-stage for idle, or 'unloaded' batteries during recharging. Analytic Systems' Chargers that offer three-stage charging can be switched to two-stage, if required, simply by moving a slide switch.

Analytic Systems makes many different types of chargers to meet your requirements, whether it be recreation vehicle, marine, locomotive, emergency installations or heavy equipment use. They are available as two-stage or two and three-stage chargers capable of charging one or two banks of 12, 16, 24, 28, 32, 36, 48 or other voltage battery banks up to 48 volts and are designed to quickly charge and condition batteries. They will extend a battery's useful life and performance so it is ready to respond when needed.

All of Analytic Systems' Chargers include adjustable output voltage for charging standard or deep cycle, lead-acid, VRLA or gel-type batteries.

The BCA310, BCA315, BCD310, BCD315, BCA610, BCD610, BCD800, BCA1000, BCA1503 and BCD1000 Series Chargers are available with optional Digital Volt-Ammeters for monitoring the voltage and charging current in each bank of batteries.

All models (except portable and BCA1503) are available with an optional remote control. This allows ON/OFF control, as well as audible and visual indicators of power on, charging, input undervoltage, output undervoltage and charger over-temperature from any convenient location.

1. Charger Sizing

Your battery manufacturer is the best source of information regarding the charging amps to best recharge your battery. If you don't have this information, we recommend you divide the amp-hours of the battery or battery bank by 4 and by 6. This will give you the range of charger sizes which will provide reasonable recharge times without overheating the batteries. For example, a 100 AH 12V battery could be charged by a 16-amp charger. From 110 VAC, you would choose the BCA310-110-12 (20 amp) for this battery.

2. Care, Feeding & Motivation For Your Battery

A stored or unemployed battery will self-discharge. Typically, a lead-acid battery will lose between 0.5 to 1.0% of its charge every day it sits idle, waiting for your attention. In less than 3 months, it will have pined away to half its rated capacity. In just over 5 months, it will be dead. The lonely lead-calcium (sealed-type) will grieve away at 0.15 to 0.3% per day. So, just from inactivity, your brand new battery will not meet half of your expectations after 7 months of idleness. Don't allow your battery to sulk and learn bad behavior. Keep it interested and happy in its work. Extend its life... give it a two or three-stage charger for company.

3. Equalize Cycle Recharges Weak Battery Cells

One additional charging cycle is available on many charger models. This is called the 'equalize' cycle. An equalize cycle is manually initiated by pressing a switch on the charger. The charger will wait until it reaches the end of the absorption stage before beginning the equalize cycle. Once equalize begins, the charger applies a current of 10% of maximum (ie. 4 amps for a 40-amp charger) for 3 hours or until the battery voltage reaches 30% above nominal (15.5 volts for a 12V battery).

The purpose of this cycle is to deliberately overcharge the good cells of a battery while allowing a weak cell to be fully charged. As this deliberate overcharging of the battery causes some water loss, it should only be performed once per month or when battery capacity appears to be diminished. In addition, as the battery temperature is elevated by this cycle, a temperature sensor is supplied to monitor battery temperature. It serves to modify the charging voltage of all cycles according to battery temperature, as well as shutting the charger off if the battery temperature exceeds 120 degrees F or 49 degrees C. This cycle is included on all BCA or BCD310, 315, 610, 615, 1000 and 1015 Series Chargers.

"Many popular 3-stage chargers, including the chargers in most inverters, limit absorption time to 3-4 hours; while acceptable for smaller battery banks, larger installations of 400-amp hrs and above require longer absorption times to completely charge the batteries. One charger which may be adjusted to absorption times appropriate to battery bank capacity are the very high quality models built by Analytic Systems. While they have a slightly higher initial cost, these industrial quality chargers are usually a once-in-a-lifetime purchase and over the years are actually less expensive than replacing several cheaper chargers. Additionally, they have many important features which translate into faster, more complete charging and greatly increased battery life, another substantial saving."

Larry Janke
Southeast Marine Services
Scappoose, OR

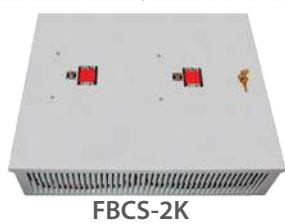
A AC SOURCE CHARGERS



BCA310



BCA610



FBCS-2K



BCA1000



BCA1503



Analytic Systems' AC Input Battery Chargers use the latest Current Mode PWM Controller IC Technology and represent the culmination of years of development effort. Features include: precision output voltage control, output short circuit protection, 2 or 3-stage charging topology, visual and audible indicators for input undervoltage and over-temperature. Extra filtering on the inputs and outputs reduce EMI to the lowest possible levels to reduce or eliminate interference with other devices, such as VHF and Sideband transceivers.

Features

- Three year warranty
- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- 3-Bank Charging (standard on 310 & 315 models)
- Cycle-by-cycle current limiting
- Output over-voltage Crowbar
- Reverse input, over-temperature and overload protection
- Dry contact output fail relay
- Custom input/output voltages from 8 to 55 DC
- Wide operating temperature range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments
- User-selectable 2 or 3-stage charging profile

Available Options

- Portable features (carrying handle and alligator clips)
- Extra wide temperature range (-40°C to + 55°C)
- Digital Volt/Ammeter
- Additional Battery Temp. Sensor
- RCP1-BCH - Remote Control Panel
- 3-Bank Charging (BCA610 & 1000 only)
- Military Package with Extra-wide Temp. Package
- Industrial Environment Upgrade Package
- Available in 110 or 220 VAC or auto-ranging inputs
- Custom output voltage available (6-72 VDC)
- Custom input voltage available (12-360 VDC)

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
BCA310	110,220	105-125,210-250	20, 10, 7.5, 5, 2.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
BCA610	110,220	105-125,210-250	40, 22, 16.5, 11, 7	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
BCA1000	110,220	105-125,210-250	60, 40, 30, 20,13	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
BCA1503	110,220	105-125,210-250	100, 50, 37.5, 25,12.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
FBCS-2K	110,208,220	105-125,190-230, 210-250	120, 80, 60, 40	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6

* See pages 30 - 32 for full product specification guides.

B STEP-UP & STEP-DOWN DC SOURCE CHARGERS OR EQUALIZERS



BCD300/301/305



BCD600/601/605

The BCD300, 301, 305, 600, 601 & 605 Series Battery Chargers and Equalizers provide up to 600 watts to charge a 12V or 24V battery system (1 or 2 banks) from a 12, 24, 32 or 36-volt source. The source and the batteries under charge must share a common ground.

Their 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. All Series are capable of charging up to two independent banks of batteries.

These units 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 lead-acid battery, including lead-acid and gel cell.

Analytic Systems' DC/DC battery chargers can be modified to adapt DC/DC to solar panels. Adjusting the input using the solar panel's VI curve, our chargers can be modified to harvest power across the range of voltages at which the most power is available. Based on our popular BCD series of chargers, these modified units have the reliability, ruggedness and charging features of our regular products, plus are optimized for use with solar input.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Cycle-by-cycle current limiting
- Output over-voltage crowbar
- Reverse input protection
- Dry contact output fail relay
- Can be left permanently connected
- Wide operating temperature range (-25°C to +40°C)
- Spark-free connection
- Adjustable output voltage for charging standard or deep-cycle, lead-acid VRLA or gel-type batteries
- Custom input/output voltages from 8 to 55 DC
- Extremely rugged and well suited for marine, industrial and other harsh environments
- Battery Equalizer models also available (BCD301 & 601)

These units safely permit 12 volts to be drawn off of a 24-volt Battery Bank

Available Options

- RCP1-BCL- Remote Control Panel
- Portable Features
- Military Environment Upgrade Package
- Extra-wide temperature range (-40°C to +55°C)

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
BCD60	12, 24	10.5-16, 20-35	5cont/ 7peak	12	13.6
BCD180	32, 48, 72	20-45, 40-65, 65-100	15, 7.5	12, 24	13.6, 27.2
BCD300	32	20-45, 30-45	25, 20	12, 24	13.6, 27.2
BCD600	32	20-45, 30-45	50, 38	12, 24	13.6, 27.2
BCD301	24	20-30	25	12	Vin/2
BCD601	24	20-30	25	12	Vin/2
BCD305	12	10.5-14, 10.5-28	26, 13	12, 24	13.6, 27.2
BCD605	12	10.5-14, 10.5-28	40, 20	12, 24	13.6, 27.2

• 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:

$$\text{Charging Current} = \frac{\text{Input} / \text{Output Volts} \times 27}{(45 \text{ for BCD605})}$$

For example, a BCD305 with 10.5VDC in and 13.6VDC out, the charging current = $10.5 / 13.6 \times 27 = 20.84$ amps

• Actual output current depends on the Input/Output Voltage Ratio = Input Volts / Output Volts x 27 (or 45 for the BCD 305 and 605)

C HIGH-VOLTAGE ISOLATED DC SOURCE CHARGERS



BCD610



BCD310



BCD1000



BCD1503

The BCD310, 610, 1000 and 1503 Series Battery Chargers charge either 12, 24 or 48-volt batteries from a 72, 110, 220 or 300 VDC power source. Other battery voltages, up to 650 volts, are also available by special order.

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, reverse battery hookup protection, output short circuit shutdown with automatic recovery and an equalize charging cycle. The output voltage is easily adjusted 0.5 volts above or below the standard output voltage to accommodate special charging requirements.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Cycle-by-cycle current limiting
- Output over-voltage crowbar
- Reverse input protection
- Dry contact output fail relay
- Custom input/output voltages from 8 to 55 DC
- Wide operating temperature range (-25°C to +40°C)
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- 19" Panel Rackmount (BCD610 & 1000 only)
- Extra-wide Temperature Range (-40°C to +55°C)
- 2nd Battery Temperature Sensor
- Digital Volt/Ammeter
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package
- 3-Bank Charging
- Portable Features

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
BCD310	110, 250, 300	100-140, 230-280, 280-360	20, 10, 7.5, 5, 3.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
BCD610	110, 250, 300	100-140, 230-280, 280-360	40, 22, 16.5, 10, 7.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
BCD1000	110, 250, 300	100-140, 230-280, 280-360	60, 40, 30, 20, 12.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
BCD1503	110, 250, 300	100-140, 230-280, 280-360	100, 50, 37.5, 25, 16.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6

* See pages 30 - 32 for full product specification guides.

D LOW-VOLTAGE ISOLATED DC SOURCE CHARGERS



BCD315



BCD615



BCD1015

The BCD315, 615 & 1015 Series Battery Chargers charge either 12, 24 or 48-volt batteries from a 24, 48 or 72-volt power source. Other battery voltages are also available by special order.

The all-new Current Mode Switching Design offers increased power and reliability in a compact package. The low ripple charging profile and standard equalize cycle greatly increases the lifetime of expensive battery systems. 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, output short circuit shutdown with automatic recovery and an equalize charging cycle.

The output voltage is easily adjusted 0.5 volts above or below the standard output voltage to accommodate special charging requirements.

Features

- Equalize charge mode & temperature compensation
- User-selectable 2 or 3-stage charging profile
- Can be left permanently connected
- Thermostatically-controlled fan (BCD615 & 1015 only)
- Wide operating temperature range (-25°C to +40°C)
- Adjustable output voltage for charging standard or deep-cycle, lead-acid, VRLA or gel-type batteries
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- 19" Panel Rackmount (BCD615 & 1015 only)
- Extra-wide temperature range (-40°C to +55°C)
- 2nd Battery Temperature Sensor
- Digital Volt/Ammeter
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package
- 3-Bank Charging
- Portable Features (carry handle and alligator clips)
- Low voltage input, 12VDC add-in
 - BCD 315, 615, 1015: 60% lower amp output

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
BCD315	24, 48, 72	20-35, 40-60, 65-90	20, 10, 7.5, 5	12, 24, 32, 48	13.6, 27.2, 36.3, 54.4
BCD615	24, 48, 72	20-35, 40-60, 65-90	40, 20, 15, 10	12, 24, 32, 48	13.6, 27.2, 36.3, 54.4
BCD1015	24, 48, 72	20-35, 40-60, 65-90	60, 40, 30, 20	12, 24, 32, 48	13.6, 27.2, 36.3, 54.4

* See pages 30 - 32 for full product specification guides.

AC/DC POWER SUPPLIES

PWS310, 610, 1000 & 1500 Series

Analytic Systems PWS Series Power Supplies provide 12, 24 or 48 volts DC at power levels from 300 to 1250 watts from a 110 or 220 VAC source. Custom output voltages are available in all series to meet our customers' special needs.

1. Typical Applications

- Base station power for radio and telecommunication equipment
- 24 VDC power for industrial controls
- 28V HMMWV Electrical Systems
- Electronic equipment displays (surveillance systems, fuel injection, ignition, etc.)
- All 12 or 24V electronics from shipboard AC power

2. Standard Features

- Fully isolated design
- Adjustable output voltage(+/- 1.0V)
- Audible & visual endicators for constant current, low input voltage, low output voltage & over-temperature
- Short circuit protection
- Over-temperature shutdown
- 3-year parts & labor warranty

* Additional features specific to each product line can be found on page 22.



This is the **PWS1510** model we developed for the USMC and US Army's 'Man-Portable Radar Project.'

Analytic Systems' Power Supplies use Switchmode technology with powerful IGBT switching transistors for reliability and efficiency with minimum size.

Circuit innovations reduce output ripple to levels previously available only from bulky and inefficient linear power supplies. Reliability features include: an input fuse, thermal shutdown, current-limiting and output short circuit protection with automatic recovery. An Output Overvoltage Crowbar circuit protects any powered devices from excessive voltage in the event of a failure of the unit.

The newly updated single-board PWS310, PWS610, PWS1000 and PWS1503 Series are ultra-quiet and feature the latest generation of current mode PWM control. Extra features include: adjustable output voltage, over-temperature, overload and output on. All models are available with either 110 or 220 VAC or auto-ranging input. All models also feature a four-contact output terminal (two positive and two negative contacts) for easy connection of devices to the supply.



"We received the 650W power supply and were very impressed. It is rugged and has performed well for us. Thank you for helping us through the purchase process."

Joseph Alexander
Southwest Research Institute

A HEAVY DUTY / INDUSTRIAL



PWS310



PWS610



PWS1000



PWS1503

The PWS Series of Power Supplies provides 12, 24 or 48 volts DC at up to 1250 watts of continuous power from a 110 or 220 VAC or auto-ranging input source.

Analytic Systems' Power Supplies use Switchmode technology with powerful IGBT switching transistors for reliability and efficiency with minimum size. Circuit innovations reduce output ripple to levels previously available only from bulky and inefficient linear power supplies. Reliability features include: an input fuse, thermal shutdown, current limiting and output short circuit protection with automatic recovery. An output over-voltage crowbar circuit protects any powered devices from excessive voltage in the event of a failure of the unit.

The newly updated, single-board PWS Series is ultra-quiet and features the latest generation of current mode PWM control. Extra features include adjustable output voltage, audible and visual indicators for low input voltage, low output voltage, over-temperature, overload and output on. Either 110 or 220 VAC input (field convertible) is available. The PWS Series also features a four-contact output terminal (two positive and two negative contacts) for easy connection of devices to the supply.

Features

- High tolerance for shock and vibration
- Current limiting
- Output over-voltage crowbar
- Reverse input protection
- Dry contact output alarm
- Wide operating temperature range (-25°C to +40°C)
- Ultra-quiet, low EMI operation; using the latest Pulse Width Technology
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- 19" Panel Rackmount (PWS610 & 1000 only)
- Extra-wide temperature range (-40°C to +55°C)
- RCP1-PWS - Remote Control Panel
- Digital Volt/Ammeter
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Marine Environment Upgrade Package
- Drip shield for wet environments
- Portable features
- Parallel output diodes to allow connection between 2 or more identical units

Specification

Model	Input Nominal	Input Actual (VDC)	Output Amps	Output Nominal	Output Volts (DC)
PWS310	110, 220	105-125, 210-250	20, 10, 7.5, 5, 3.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
PWS610	110, 220	105-125, 210-250	40, 20, 15, 10, 7.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
PWS1000	110, 220	105-125, 210-250	60, 40, 30, 20, 12.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6
PWS1503	110, 220	105-125, 210-250	100, 50, 37.5, 25, 16.5	12, 24, 32, 48, 72	13.6, 27.2, 36.3, 54.4, 81.6

* See pages 30 - 32 for full product specification guides.

DC/AC INVERTERS

Run 120 or 220-volt AC equipment trouble-free from 12, 24, 32, 36, 48 or 72V DC batteries in any industrial or mobile equipment environment where standard AC power is not available.

Analytic Systems produces three types of inverters converting DC to AC - our IQS, IPS and IVS PureSine Series. They can provide high start-up power required in many applications, such as tools, electronic equipment and appliances.

Powerful MosFet transistors, coupled with Analytic Systems' sensitive control circuitry provide reliable operation in the most demanding environments. The ON-OFF switch illuminates when AC power is present, providing positive indication of proper operation. Heavy input filtering ensures that no electrical noise will be generated to interfere with autopilots, radios or other devices sharing the same batteries. The transformer-type output provides protection against the generation of electrical 'noise' and gives excellent filtering of the AC waveform to ensure trouble-free operation of any type of AC equipment. The power our IPS and IVS Series Inverters produce is cleaner and has less fluctuation than even household AC.

Analytic Systems Inverters all have a large amount of input capacitance or internal energy storage. This significantly reduces the amount of 50/60 Hz ripple fed back to the battery and thus into all other equipment powered from the battery. We have seen many types of equipment, such as autopilots, radars, radios, etc. suffer reduced performance when sharing batteries with standard inverters that have very little input energy storage.

1. Features of Analytic Systems Inverters

Low voltage shutdown circuitry protects batteries. An over-temperature circuit protects the inverter. When required, cooling is provided by an automatic fan control. The units are protected against overloads, as well as direct short circuits.

The IQS300, IQS600 and IPS300 Series have built-in electronic Ground Fault Protection (GFI). Optional GFI receptacles can be added to the IPS600, IPS1000, IPS1500 and IPS2000 Inverters. All inverters feature 1500 volts of isolation between the DC input and the AC output, which allows the inverter to be powered from a positive ground source, such as telecom -24 or -48 VDC power.

On the IPS300 Series, a special circuit reduces power consumption to the lowest possible level when the inverter is idle. One or two Decora-style AC receptacles provide for easy connection of 110 VAC inverters. One or two IEC320 receptacles and plugs for output cables easily connect 220 VAC inverters to their loads. Provision is made for direct wiring of the IPS600, 1000, 1500 and 2000 inverters.

The major use of our IPS Series Inverters is for running communications in military and alternative energy environments. They have also been used for running recording studios, tube-type hi-fi stereos and home theaters. The US Navy incorporates them into HMMWV vehicles along with high output battery chargers, also manufactured by Analytic Systems, for running field computers. Disney™ uses them for running public address systems on roving carts used by street performers at Disneyworld™.

2. "Instant-Switch" UPS Option

An optional AC input and automatic switch-over circuit is available to allow the IPS600, IPS1000, IPS1500 and IPS2000 Inverter to function as an off-line UPS. Whenever AC power is available, it is connected to the outlet receptacles. If the AC power fails, or drops below 98 volts rms, the inverter takes over powering the receptacles in as little as 2 AC cycles, and will continue until power is restored, or the batteries become discharged.

A HEAVY-DUTY / QUASI-SINE INVERTERS



IQS300



IQS600

The Q'Sine Series of Power Inverters provide 120 volts AC or 220 volts AC at 300 or 600 watts of continuous power from a 12, 24 or 32-volt DC source.

State-of-the-art MOSFET technology, coupled with unique 'Soft-Start' circuitry guarantees reliable operation. The ON-OFF switch illuminates when AC is present at the outputs to provide positive indication of proper operation.

Full electrical isolation between the input and output allows operation from either positive ground or negative ground DC power sources. The output is a full 160 or 320 Volts peak (115/230V rms) to allow it to handle most applications from sonar monitors to electrical drills.

Extremely heavy input filtering ensures that no electrical noise will be generated to interfere with autopilots, radios or other devices sharing the same batteries. The transformer-type output prevents any spikes or surges that might damage computers or other sensitive equipment (see sidebar).

Low voltage shutdown circuitry protects the batteries. Current Limiting and Over-Temperature shutdown protect the inverter. Diagnostic LEDs indicate the cause of any shutdown and show when the unit is overloaded.

Features

- High tolerance for shock and vibration
- Ultra-quiet, low EMI operation
- Current limiting
- Extra-Heavy Input Filtering to eliminate interference with other equipment sharing the same batteries
- Short circuit protection with automatic recovery
- Diagnostic LEDs
- Wide operating temperature range (-25°C to +40°C)
- Ground-fault protection
- Built-in decora-style receptacle accepts all standard 110 VAC plugs (IEC 320 Plug on the 220V model)
- Audible & visual alarms
- Extremely rugged and well suited for marine, industrial and other harsh environments

Available Options

- RCP1-IQS - Remote Control Panel
- Ruggedization against shock and vibration
- Extra-wide temperature range (-40°C to +55°C)
- Forklift Environment Upgrade Package
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package

Specification

Model	Input Nominal	Input Actual (VDC)	Output Watts	Output Nominal	Output Volts (AC rms)
IQS300	12, 24, 32	11-14, 22-28, 30-38	300 cont, 450 Peak	110, 220	115+/-5, 230+/-10
IQS600**	12, 24, 32	11-14, 22-28, 30-38	600 cont, 900 Peak	110, 220	115+/-5, 230+/-10

* See pages 30 - 32 for full product specification guides.

**CSA Certified

B HEAVY-DUTY / PURE-SINE INVERTERS



IPS300



IPS600



IPS1000

IPS1500 & IPS2000 same chassis style

The IPS Series of Sinewave Inverters provide crystal clear 110 AC or 220 AC power from a 12, 24, 32, 40-volt DC source. Units are available from 300 to 2000 watts.

As computers move into non-traditional work areas at an ever-increasing rate, more and more specialty software packages become available. However, there is a major problem. Computers require clean, pure AC power to work reliably. If you power one from the same Genset that runs your heavy loads, you could damage it from surges and spikes generated by switching those loads.

If you power it from the same inverter that runs a microwave and other electrical devices, similar problems occur, plus voltage dropouts from excessive loads on the inverter add to the problem. Also, most inverters produce 'Quasi-Sine Wave' AC, which often do not run computers very well. Complaints of noisy displays, cursors that move by themselves and more abound.

The IPS Series of 'True Sine Wave' Inverters are designed specifically for running computers and other electronics in mobile and other off-grid locations.

Features

- 'PureSine Wave' 120VAC/60Hz fully-regulated output, exactly the same as household AC
- Crystal-controlled for precise frequency (+/- 0.01 Hz)
- Extra-Heavy input filtering to eliminate interference with other equipment sharing the same batteries
- One or two AC receptacles for easy connection of up to 4 devices
- Transformer-type output to protect computers and other sensitive equipment from surges and spikes
- State-of-the-art MosFet technology and unique 'Soft-Start' circuitry for reliable operation
- Wide operating temperature range (-25°C to +40°C)
- Current limiting
- LED indicators & buzzer to alert the cause of shutdown
- Overload, short circuit and ground-fault protected
- Thermostatically-controlled cooling fan

Available Options

- RCP1-IPS - Remote Control Panel
- GFI Receptacle Open
- Extra-wide temperature range (-40°C to +55°C)
- Forklift Environment Upgrade Package
- Industrial Environment Upgrade Package
- Military Environment Upgrade Package
- Line detect & autoswitch for operation as an 'offline' UPS (IPS600, 1000, 1500 & 2000)

Specification

Model	Input Nominal	Input Actual (VDC)	Output Watts	Output Nominal	Output Volts (AC rms)
IPS300**	12, 24, 32	10.5-16, 20-30, 30-40	300 cont, 450 Peak	110, 220	115+/-5, 230+/-10
IPS600	12, 20, 40	10.5-16, 20-40, 40-80	600 cont, 900 Peak	110, 220	115+/-5, 230+/-10
IPS1000	12, 20, 40	10.5-16, 20-40, 40-80	1000 cont, 1500 Peak	110, 220	115+/-5, 230+/-10
IPS1500	20	20-40	1500 cont	110, 220	115+/-5, 230+/-10
IPS2000	20	20-40	2000 cont	110, 220	115+/-5, 230+/-10

* See pages 30 - 32 for full product specification guides.

**CSA Certified

AC/AC FREQUENCY CONVERTERS

AC/AC Frequency Converters, Single Phase

Analytic Systems' Single and 3-Phase Sine-Wave Inverters are designed for telecommunications, industrial, commercial, mobile and military applications. They deliver output power ranging from 250 VA to 5000 VA and generate nominal output voltages of 115 VAC or 220 VAC, at frequencies of 50, 60 or 400Hz. A broad range of input voltages are available. See Table 1 for available models.

3-Phase to 3-Phase (FTT Series) and Single-Phase to 3-Phase (FTP Series) frequency converters are available in 1500, 3000 and 6000VA (see website).

Table 1: AC/AC Single Phase Frequency Converters

Generic Model	Input Voltages	Power (VA)	Voltage (Volts)	Current (Amps)
FCA250	115/230, 47...410Hz	250	115/230VAC 50, 60, 400Hz	2.2 / 1.1
FCA500	115/230, 47...410Hz	500	115/230VAC 50, 60, 400Hz	4.4 / 2.17
FCA1000	115/230, 47...410Hz	1000	115/230VAC 50, 60, 400Hz	8.7 / 4.34
FCA1500	115/230, 47...410Hz	1500	115/230VAC 50, 60, 400Hz	13
FCA2000	115/230, 47...410Hz	2000	115/230VAC 50, 60, 400Hz	17.4
FCA2500R	115/230, 47...410Hz	2500	115/230VAC 50, 60, 400Hz	21.7 / 10.9
FCA5000R	115/230, 47...410Hz	5000	115/230VAC 50, 60, 400Hz	43.4 / 21.7

TELECOM INVERTERS

Telecom Inverters

Analytic Systems offers a broad range of telecom-quality sine-wave inverters for professional applications, with output power ranging from 100 VA to 5000 VA.

These products are designed to achieve the optimum ruggedness required for transportation, industrial, telecommunications and military applications. 19" or 23" rackmount hardware is offered for all models. Plug-in modular system alternatives are available for all larger models.

In addition to quality of workmanship, this concept indicates that our inverters comply fully with EMI requirements for EN 55022 Class B with a significant dB margin. The audio frequency range noise (C-message) on the input is also very low.

Analytic Systems' Inverters have a multi-stage filter on the input and output, and have large hold-up capacitors on the internal 200 VDC or 400 VDC rail for complete elimination of the 60 Hz ripple on the inverter input.

3-Phase industrial inverters (ITP Series) available in 1500, 3000 and 6000VA (see website).

See Table 2 for available models.

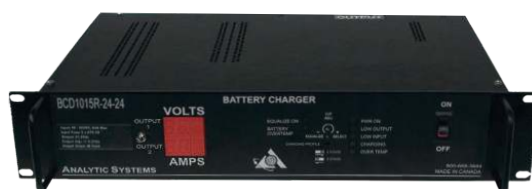
Table 2: DC/AC Single Phase Inverters

Generic Model	Standard Input Voltages	Power (VA)	Voltage (Volts)	Current (Amps)
IVS100	24, 32, 48, 125	100	115 VAC	0.87
IVS150	24, 36, 48, 125	150	115/230 VAC	1.3/ 0.65
IVS200	24, 36, 48, 125	200	115/ 230 VAC	1.7/ 0.86
IVS300	24, 32, 48, 125	300	115/ 230 VAC	2.6/ 1.3
IVS1500	24, 32, 48, 72, 125, 250	1500	115/ 230 VAC	13
IVS2000	24, 32, 48, 72, 125, 250	2000	115/ 230 VAC	17.4
IVS2000R	24, 32, 48, 72, 125, 250	2000	115/ 230 VAC	17.4 / 8.7
IVS2500R	24, 32, 48, 72, 125, 250	2500	115/ 230 VAC	21.7/ 10.9
IVS3000R	24, 32, 48, 72, 125, 250	3000	115/ 230 VAC	26
IVS4000R	24, 32, 48, 72, 125, 250	4000	115/ 230 VAC	34
IVS5000R	24, 32, 48, 72, 125, 250	5000	115/ 230 VAC	43.5
RVS500	125	500	115/230 VAC	4.4/ 2.2
LVS1000	24, 36, 48, 125, 250	1000	115/230 VAC	8.7/ 4.34

19" RACKMOUNT PRODUCTS



VTC1000R



BCD1015R

Many of Analytic Systems' products are offered as 19" Rackmount Units, including:

- AC Battery Chargers (Rectifiers)
- Isolated DC Battery Chargers
- Power Supplies
- Isolated Voltage Converters
- Telecom Inverters

These compact packages utilize the latest Current Mode Switching Technology and offer 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. Many 300-600 Watt units can be mounted on an optional 19" rackplate.

1. Common Features

- Standard Digital Volt/Ammeter
- Fan-cooled
- Custom output voltages available (12V to 55V)
- Output overvoltage crowbar
- Dry contact output fail relay
- Optional output paralleling diodes
- Custom input voltages
- Wide temperature option
- Conformal coating and/or harsh environment
- Ruggedization option

2. Battery Charger Features

- Ability to function as a Power Supply
- Temperature-compensated charging
- User-selectable 2 or 3-stage Charging Profile Adjustable
- Output voltage for charging standard or deep-cycle, lead-acid, VRLA or Gel cell-type batteries

3. Voltage Converters/ Power Supply Features

- Optional Battery Backup
- 20% Peak Current

4. Telecom Inverters (Third Party Products)

- Standard 19"/23", 2U Rackmount
- 1 kVA / 800 Watts; 2 kVA / 1600 Watts
- High efficiency
- PureSine Wave output
- Intelligent Microprocessor - based control
- Utility bypass function
- UL / cUL approval
- 2-3 year warranty
- Low EMI/RFI interference
- RS-232 communication
- User-friendly LCD and LED displays
- Intelligent software for power management
- Internal over-temperature protection
- Input reverse polarity protection
- Battery high/low protection
- Output overload protection

REMOTE CONTROL & DVAM

1. Options

Analytic Systems provides optional remote control panels and digital meters for most of the power conversion products we manufacture. Remote Panels and Digital Meters provide easy operation and monitoring in many installations and may be available where power conversion units are installed in difficult-to-reach locations, such as :

- Solar Arrays
- Marine Installations
- Industrial Applications
- Portable Maintenance Equipment
- Heavy-Industrial Equipment
- Mining Equipment
- Telecommunications Units
- Industrial and Manufacturing Sites

2. Remote Monitoring & Control Panels

Each remote control is supplied with a 10-foot cable which is terminated with a 9 pin male 'D' connector for simple connection. The cable attaches to the remote control by a color-coded terminal strip which permits easy wiring of the cable. Longer cables are available on request at a small additional charge per foot.

The remote panel has an ON-OFF power switch with a POWER ON indicator light. In the event that the unit shuts itself down from incorrect application or some type of overload, the panel has diagnostic LEDs and audible alarms for :

- Low output
- Overload
- Standby
- Low input
- Over-temperature
- Constant current



RCP1 Specifications	
Dimensions	3.37 x 2.60 in / 9.6 x 6.2 cm
Depth	2.5 in / 6.5 cm
Material	Marine Grade Aluminum
Finish	Black Powder Epoxy

Model	Compatible with
RCP1-IQS	IQS300, 600
RCP1-IPS	IPS300, 600, 1000, 1500, 2000
RCP1-PWS	PWS310, 610, 1000, 1503
RCP1-BCH	BCA310, 610, 1000, 1503
	BCD310, 315, 610, 615, 1000, 1015
RCP1-BCL	BCD300, 301, 305, 600, 601, 605
RCP1-VTH	VTC310, 315, 610, 615, 1000, 1015
RCP1-VTL	VTC300, 305, 600, 605

3. Digital Volt / Ammeter (DVAM)

The Digital Volt/Ammeter option incorporates two 'Super Bright' high-quality LED Displays. This allows for precision monitoring of both the output voltage and current at the same time. The display is bright enough to be seen at least 20 feet away.

Part Number	Available for:
DVAM	BCA310, 610, 1000, 1503
	BCA310, 315, 610, 615, 1000, 1015
	PWS310, 610, 1000, 1503
	VTC310, 315, 610, 615, 1000, 1015
	Included as a Standard Part in 19" Rackmount Configuration for:
	BCA610R, 1000R
	BCA610R, 615R, 1000R, 1015R
	PWS610, 1000R
	VTC610R, 615R, 1000R, 1015R

OEM DESIGN & MANUFACTURING

Analytic Systems has always had an aggressive research and development program. We can use this capability to custom design and then manufacture power conversion products for original equipment manufacturers (OEM). If you need custom power conversion in quantities from one to thousands, send us your specifications and we would be pleased to submit a design and production proposal to meet your needs.

Some recent OEM products designed and manufactured by Analytic Systems include:

MBU Battery Pack



Developed for the MBU Field Kitchen Cook Stove that the Proheat division of Teleflex builds for the US Army. This battery pack contains two 40-amp-hour VRLA batteries from Hawker Energy as well as an integrated multi-stage charger tailored to the requirements of these batteries. The charger is powered from any convenient source of 24 VDC, such as the auxiliary power outlet on a standard military HumVee.

LIAC600-28: Lithium-Ion AC Charger



This LIAC600-28 Charger is designed for recharging the SAFT Lithium-Ion Battery (LBB) used by the US Armed Forces and is controlled using a standard Raytheon interface. It can also be used in Bypass Mode as a 'stand-alone' power supply. It is designed to deliver 32.0 VDC at up to 22 amps continuous to recharge the battery. The output charges to 28 VDC at up to 22 amps when operating in Bypass Mode.

PWS1510MS-26.0



This power supply produces 24 VDC power (26.0 VDC actual) and can be used for running the MBU Field Kitchen Stoves as well as many other applications. This unit is designed with dual input filters and extra output filtering beyond commercial/ industrial standards to meet EMI requirements of MIL461E. The unit will operate at temperatures up to +85 degrees Celsius with a derating of 2.5% per degree C beyond 50 degrees. Protection includes: inrush current limiting, input under voltage shutdown, over-temperature shutdown (with automatic recovery), output current limiting, output short-circuit protection (with automatic recovery) and output over-voltage crowbar (with automatic recovery).

BCD800-SP



The BCD800 is a waterproof and ruggedized DC-DC battery charger. The design was based on a COTS circuit board then modified to provide battery management for truck mounted climate control systems in a new waterproof and shock resistant chassis. These "engineless HVAC" systems allow for optimal cab comfort while complying with anti-idle pollution control legislation. The systems batteries must be charged in the shortest possible time to ensure the power is available when needed. The BCD800 achieves this by providing 60 Amps power output and using efficient, reliable switch mode technology in a externally cooled, hardened case, suitable for mounting to the under-carriage frame of a long haul transport truck.

A Voltage Converter Selection Guide

Heavy-Duty DC/DC Converters (Common Negative)

Series	Input Voltages (VDC)	Output Voltages (VDC)	Output Amps Continuous / Peak	Part Number
VTC60	10.5-16V	5V	5A / 7A	VTC60-12-5
	20-35V	13.6V		VTC60-24-12
VTC65	20-45V	13.6V	5A / 7A	VTC65-32-12
	30-45V	27.2V	2.5A / 3A	VTC65-32-24
	40-65V	13.6V	5A / 7A	VTC65-48-12
	40-65V	27.2V	2.5A / 3A	VTC65-48-24
	65-100V	13.6V	5A / 7A	VTC65-72-12
	65-100V	27.2V	2.5A / 3A	VTC65-72-24
VTC120	11-15V	12.0V	5A / 5.5A	VTC120-12-12
			7.5A / 8A	VTC120h-12-12
		24.0V	5A / 5.5A	VTC120-12-24
			7.5A / 8A	VTC120h-12-24
VTC140/240	20-35V	13.8V	12A / 15A	VTC140-24-12
			20A / 23A	VTC240-24-12
VTC180	20-45V	13.6V	15A / 18A	VTC180-32-12
	30-45V	27.2V	7.5A / 9A	VTC180-32-24
	40-65V	13.6V	15A / 9A	VTC180-48-12
	40-65V	27.2V	7.5A / 9A	VTC180-48-24
	65-100V	13.6V	15A / 18A	VTC180-72-12
	65-100V	27.2V	7.5A / 9A	VTC180-72-24
VTC300	20-35V	13.6 +/- 0.5	25A / 35A	VTC300-32-12
	30-45V	27.2 +/- 0.5	20A / 25A	VTC300-32-24
VTC305	10.5-18V	13.5-17.0V	30A (Input)	VTC305-12-12
	10.5-28V	24.0-27.5V	30A (Input)	VTC305-12-24
VTC600	20-45V	13.6 +/- 0.5	50A / 55A	VTC600-32-12
	30-45V	27.2 +/- 0.5	35A / 40A	VTC600-32-24
VTC605	10.5-18V	13.5-17.0V	*17 - 45A	VTC605-12-12
	10.5-28V	24.0-27.5V	*17 - 45A	VTC605-12-24

Heavy-Duty DC/DC Converters (Fully Isolated)

VTC120i	11-15V	12.0V	5A / 5.5A or 7.5A / 8A (VTC120ih)	VTCi120-12-12
		24.0V		VTCi120-12-24
		48.0V		VTCi120-12-48
	22-30V	12.0V	5A / 5.5A or 7.5A / 8A (VTC120ih)	VTCi120-24-12
		24.0V		VTCi120-24-24
		48.0V		VTCi120-24-48
	40-60V	12.0V	5A / 5.5A or 7.5A / 8A (VTC120ih)	VTCi120-48-12
		24.0V		VTCi120-48-24
		48.0V		VTCi120-48-48
VTC315	20-35V	13.6 +/- 1.0	20A / 22.5A	VTC315-24-12
		27.2 +/- 1.0	10A / 12.5A	VTC315-24-24
		54.4 +/- 1.0	5A / 6A	VTC315-24-48
	40-60V	13.6 +/- 1.0	20A / 22.5A	VTC315-48-12
		27.2 +/- 1.0	10A / 12.5A	VTC315-48-24
		54.4 +/- 1.0	5A / 6A	VTC315-48-48
	65-90V	13.6 +/- 1.0	20A / 22.5A	VTC315-72-12
		27.2 +/- 1.0	10A / 12.5A	VTC315-72-24
		54.4 +/- 1.0	5A / 6A	VTC315-72-48
VTC310	100-140V	13.6 +/- 1.0	20A / 22.5A	VTC310-110-12
		27.2 +/- 1.0	10A / 12.5A	VTC310-110-24
		54.4 +/- 1.0	5A / 6A	VTC310-110-48
	230-280V	13.6 +/- 1.0	20A / 22.5A	VTC310-250-12
		27.2 +/- 1.0	10A / 12.5A	VTC310-250-24
		54.4 +/- 1.0	5A / 6A	VTC310-250-48

Heavy-Duty DC/DC Converters (Fully Isolated) CONTINUED

Series	Input Voltages (VDC)	Output Voltages (VDC)	Output Amps Continuous / Peak	Part Number	
VTC610	110-140V	13.6 +/- 1.0	40A / 45A	VTC610-110-12	
		27.2 +/- 1.0	20A / 25A	VTC610-110-24	
		36.3 +/- 1.0	15A / 18A	VTC610-110-32	
		54.4 +/- 1.0	10A / 12.5A	VTC610-110-48	
	230-280V	13.6 +/- 1.0	40A / 45A	VTC610-250-12	
		27.2 +/- 1.0	20A / 25A	VTC610-250-24	
		36.3 +/- 1.0	15A / 18A	VTC610-250-32	
		54.4 +/- 1.0	10A / 12.5A	VTC610-250-48	
VTC615	20-35V	13.6 +/- 1.0	40A / 45A	VTC615-24-12	
		27.2 +/- 1.0	20A / 25A	VTC615-24-24	
		54.4 +/- 1.0	10A / 12.5A	VTC615-24-48	
	40-60V	13.6 +/- 1.0	40A / 45A	VTC615-48-12	
		27.2 +/- 1.0	20A / 25A	VTC615-48-24	
		54.4 +/- 1.0	10A / 12.5A	VTC615-48-48	
	65-90V	13.6 +/- 1.0	40A / 45A	VTC615-72-12	
		27.2 +/- 1.0	20A / 25A	VTC615-72-24	
		54.4 +/- 1.0	10A / 12.5A	VTC615-72-48	
	VTC1000	100-140V	13.6 +/- 1.0	60A / 70A	VTC1000-110-12
			27.2 +/- 1.0	40A / 45A	VTC1000-110-24
			54.4 +/- 1.0	20A / 22.5A	VTC1000-110-48
230-280V		13.6 +/- 1.0	60A / 70A	VTC1000-250-12	
		27.2 +/- 1.0	40A / 45A	VTC1000-250-24	
		54.4 +/- 1.0	20A / 22.5A	VTC1000-250-48	
280-360V		13.6 +/- 1.0	60A / 70A	VTC1000-300-12	
		27.2 +/- 1.0	40A / 45A	VTC1000-300-24	
		54.4 +/- 1.0	20A / 22.5A	VTC1000-300-48	
VTC1015		22-35V	13.6 +/- 1.0	60A / 70A	VTC1015-24-12
			27.2 +/- 1.0	40A / 45A	VTC1015-24-24
			54.4 +/- 1.0	20A / 22.5A	VTC1015-24-48
	40-60V	13.6 +/- 1.0	60A / 70A	VTC1015-48-12	
		27.2 +/- 1.0	40A / 45A	VTC1015-48-24	
		54.4 +/- 1.0	20A / 22.5A	VTC1015-48-48	
	65-90V	13.6 +/- 1.0	60A / 70A	VTC1015-72-12	
		27.2 +/- 1.0	40A / 45A	VTC1015-72-24	
		54.4 +/- 1.0	20A / 22.5A	VTC1015-72-48	
VTC1503	100-140V	13.6 +/- 1.0	100A	VTC1503-110-12	
		27.2 +/- 1.0	50A	VTC1503-110-24	
		54.4 +/- 1.0	25A	VTC1503-110-48	
	230-280V	13.6 +/- 1.0	100A	VTC1503-250-12	
		27.2 +/- 1.0	50A	VTC1503-250-24	
		54.4 +/- 1.0	25A	VTC1503-250-48	

B Power Supply Selection Guide

Heavy-Duty AC/DC Power Supplies

Series	Input Voltages (VDC)	Output Voltages (VDC)	Output Amps Continuous / Peak	Part Number
PWS310	105-125V	13.6 +/- 1.0	20A	PWS310-110-12
		27.2 +/- 1.0	10A	PWS310-110-24
		54.4 +/- 1.0	5A	PWS310-110-48
	210-250V	13.6 +/- 1.0	20A	PWS310-220-12
		27.2 +/- 1.0	10A	PWS310-220-24
		54.4 +/- 1.0	5A	PWS310-220-48
PWS610	105-125V	13.6 +/- 1.0	40A	PWS610-110-12
		27.2 +/- 1.0	20A	PWS610-110-24
		54.4 +/- 1.0	10A	PWS610-110-48
	210-250V	13.6 +/- 1.0	40A	PWS610-220-12
		27.2 +/- 1.0	20A	PWS610-220-24
		54.4 +/- 1.0	10A	PWS610-220-48
PWS1000	105-125A	13.6 +/- 1.0	60A	PWS1000-110-12
		27.2 +/- 1.0	40A	PWS1000-110-24
		54.4 +/- 1.0	20A	PWS1000-110-48
	210-250V	13.6 +/- 1.0	60A	PWS1000-220-12
		27.2 +/- 1.0	40A	PWS1000-220-24
		54.4 +/- 1.0	20A	PWS1000-220-48
PWS1503	105-125V	13.6V	100A	PWS1503-110-12
		27.2V	50A	PWS1503-110-24
	210-250V	13.6V	100A	PWS1503-220-12
		27.2V	50A	PWS1503-220-24

C AC Battery Charger Selection Guide

Heavy-Duty AC/DC Battery Chargers

Series	AC Source Volts 45-65 Hz	Battery Volts	Charging Amps	Part Number
BCA310	105-125	12V	20A	BCA310-110-12
		16V	18A	BCA310-110-16
		24V	10A	BCA310-110-24
		32V	7.5A	BCA310-110-32
		48V	5A	BCA310-110-48
	210-250	12V	20A	BCA310-220-12
		24V	10A	BCA310-220-24
		48V	5A	BCA310-220-48
BCA610	105-125	12V	40A	BCA610-110-12
		24V	22A	BCA610-110-24
		32V	16.5A	BCA610-110-32
		48V	11A	BCA610-110-48
	210-250	12V	40A	BCA610-220-12
		24V	22A	BCA610-220-24
		48V	11A	BCA610-220-48
BCA1000	105-125	12V	60A	BCA1000-110-12
		24V	40A	BCA1000-110-24
		32V	30A	BCA1000-110-32
		48V	20A	BCA1000-110-48
	210-250	12V	60A	BCA1000-220-12
		24V	40A	BCA1000-220-24
		48V	20A	BCA1000-220-48
BCA1503	105-125	12V	100A	BCA1501-110-12
		24V	50A	BCA1501-110-24
	210-250	12V	100A	BCA1501-220-12
		24V	50A	BCA1501-220-24

D DC Battery Charger Selection Guide

Heavy-Duty DC/DC Battery Chargers

Series	DC Source Volts	Battery Volts	Charging Amps	Part Number
BCD60	10.5-16V	5V	5A	BCD60-12-5
	20-35V	12V	12A	BCD60-24-12
BCD180	20-45V	12V	15A	BCD180-32-12
		24V	7.5V	BCD180-32-24
	40-65V	12V	15A	BCD180-48-12
		24V	7.5V	BCD180-48-24
	65-100V	12V	15A	BCD180-72-12
		24V	7.5V	BCD180-72-24
BCD300	20-45V	12V	25A	BCD300-32-12
	30-45V	24V	20A	BCD300-32-24
BCD301	20-30V	Input Volts / 2	25A	BCD301-24-12
BCD305	10.5-14V	12V	*17-27A	BCD305-12-12
	10.5-28V	24V	*10-27A	BCD305-12-24
BCD310	100-140V	12V	20A	BCD310-110-12
		24V	10A	BCD310-110-24
		48V	5A	BCD310-110-48
	230-280V	12V	20A	BCD310-250-12
		24V	10A	BCD310-250-24
		48V	5A	BCD310-250-48
BCD315	20-35V	12V	20A	BCD315-24-12
		24V	10A	BCD315-24-24
		48V	5A	BCD315-24-48
	40-60V	12V	20A	BCD315-48-12
		24V	10A	BCD315-48-24
		48V	5A	BCD315-48-48
	65-90V	12V	20A	BCD315-72-12
		24V	10A	BCD315-72-24
		48V	5A	BCD315-72-48
BCD600	20-45V	12V	50A	BCD600-32-12
	30-45V	24V	38A	BCD600-32-24
BCD601	20-30V	Input Volts / 2	50A	BCD601-24-12
BCD605	10.5-14V	12V	*17-45A	BCD605-12-12
	10.5-28V	24V	*17-45A	BCD605-12-24

Options-Part Numbers & Discriptions

bb	Battery Backup: trickle charger
c	Conformal Dip: PCB-coated with silicon dipping compound
d	Output Diode: output isolation diodes added
fc	Fuel Cell Modification: low voltage shutdown added
fl	Forklift Modification: surge and reverse protection
h	High Output: extra-high output current (VTC models only)
nr	Non-regulated: non-regulated output voltage (VTC120 only)
MS	Military Modification: wide temp. -40°C to +55°C parts, extra silicon and conformal dip added
lv	Low Voltage Shutdown: 6V input on a VTC305
v	High Vibration: extra silicon and conformal dip added
w	Wide Temperature: -40°C to +55°C, conformal spray added
p	Portable: input & output cables added, complete with alligator clips and installation handle
f	Open Frame: no chassis, just heatsink bars
R	Rackmount: unit built into a rackmount chassis
DM	Digital Meter: 'Super Bright' Digital Volt/Ammeter
C1	Class1/ Div2 Hazardous environment

D DC Battery Charger Selection Guide Cont'd

Heavy-Duty DC/DC Battery Chargers				
Series	DC Source Volts	Battery Volts	Charging Amps	Part Number
BCD610	100-140V	12V	40A	BCD610-110-12
		24V	22A	BCD610-110-24
		48V	10A	BCD610-110-48
	230-280V	12V	40A	BCD610-250-12
		24V	22A	BCD610-250-24
		48V	10A	BCD610-250-48
BCD615	20-35V	12V	40A	BCD615-24-12
		24V	20A	BCD615-24-24
		48V	10A	BCD615-24-48
	40-60V	12V	40A	BCD615-48-12
		24V	20A	BCD615-48-24
		48V	10A	BCD615-48-48
	65-90V	12V	40A	BCD615-72-12
		24V	20A	BCD615-72-24
		48V	10A	BCD615-72-48
BCD800	10.5-14V	12V	60A	BCD800-12-12
	10.5-28V	24V	30A	BCD800-12-24
BCD1000	100-140V	12V	60A	BCD1000-110-12
		24V	40A	BCD1000-110-24
		48V	20A	BCD1000-110-48
	230-280V	12V	60A	BCD1000-250-12
		24V	40A	BCD1000-250-24
		48V	20A	BCD1000-250-48
BCD1015	22-35V	12V	60A	BCD1015-24-12
		24V	40A	BCD1015-24-24
		48V	20A	BCD1015-24-48
	40-60V	12V	60A	BCD1015-48-12
		24V	40A	BCD1015-48-24
		48V	20A	BCD1015-48-48
	65-100V	12V	60A	BCD1015-72-12
		24V	40A	BCD1015-72-24
		48V	20A	BCD1015-72-48
BCD1503	360V	12V	100A	BCD1503-360-12
		24V	50A	BCD1503-360-24

E Inverter Selection Guide

Heavy-Duty DC/AC Sinewave Power Inverters (300W - 1000W)				
Series	Input Voltage (VDC)	Output Voltage (VAC)	Watts Continuous / Peak	Part Number
IPS300	10.5-16	115 +/- 5.0V	600 / 900	IPS300-12-110
		220 +/- 10.0V		IPS300-12-220
	20-30	115 +/- 5.0V		IPS300-24-110
		220 +/- 10.0V		IPS300-24-220
	30-40	115 +/- 5.0V		IPS300-32-110
		220 +/- 10.0V		IPS300-32-220
IPS600	10.5-16	115 +/- 5.0V	600 / 900	IPS600-12-110
	20-40	220 +/- 10.0V		IPS600-20-110
IPS1000	10.5-16	115 +/- 5.0V	1000 / 1500	IPS1000-12-110
		220 +/- 10.0V		IPS1000-12-220
	20-40	115 +/- 5.0V		IPS1000-20-110
		220 +/- 10.0V		IPS1000-20-220
	40-80	115 +/- 5.0V		IPS1000-40-110
		220 +/- 10.0V		IPS1000-40-220
IPS1500	20-40	115 +/- 5.0V	1000 / 1500	IPS1500-24-110
		220 +/- 10.0V		IPS1500-24-220
		115 +/- 5.0V		IPS1500-32-110
		220 +/- 10.0V		IPS1500-32-220
IPS2000	20-40	115 +/- 5.0V	1000 / 1500	IPS2000-24-110
		220 +/- 10.0V		IPS2000-24-220

Heavy-Duty DC/AC Modified Sinewave Power Inverters (300W-600W)				
Series	Input Voltage (VDC)	Output Voltage (VAC)	Watts Continuous / Peak	Part Number
IQS300	11-14	115 +/- 5.0V	300 / 450	IQS300-12-110
		220 +/- 10.0V		IQS300-12-220
	22-28	115 +/- 5.0V		IQS300-24-110
		220 +/- 10.0V		IQS300-24-220
	30-38	115 +/- 5.0V		IQS300-32-110
		220 +/- 10.0V		IQS300-32-220
IQS600	11-14	115 +/- 5.0V	600 / 900	IQS600-12-110
		220 +/- 10.0V		IQS600-12-220
	22-28	115 +/- 5.0V		IQS600-24-110
		220 +/- 10.0V		IQS600-24-220
	30-38	115 +/- 5.0V		IQS600-32-110
		220 +/- 10.0V		IQS600-32-220



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