



POWER CONVERSION SPECIALISTS
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Brodribb Phase Controlled Battery Chargers

Introduction

The Brodribb range of thyristor controlled battery chargers are intended to automatically float or boost charge batteries and support either continuous standing loads such as control, telecommunications or intermittent loads such as switchgear tripping, emergency lighting and engine starting.

The chargers offer a wide range of control and alarm facilities that make them suitable for unattended operation and their precisely regulated and filtered output reduces the amount of maintenance required for the battery system.

Brodribb thyristor controlled chargers are typically supplied in single phase input up to 3KVA capacity and in three phase input above 3KVA capacity.

The charger cabinets can be wall, rack or floor standing and can house the battery, depending upon the size of the charger and specific requirements.

Brodribb chargers are designed to comply with the relevant sections of Australian Standard AS 4044 "Battery chargers for stationary batteries." The chargers are designed and manufactured in Australia.

Technical Description : Phase controlled Chargers

Power Conversion

The chargers use reliable high voltage thyristors to provide a controlled voltage, derived from the secondary of an isolation transformer. The mains input is isolated from the output by a double wound isolation transformer conservatively designed for temperature rise and have a 3KV primary withstand voltage.

The output of the thyristor bridge is then both inductively and capacitively filtered to give both a low ripple voltage and low ripple current, which aids long battery life.

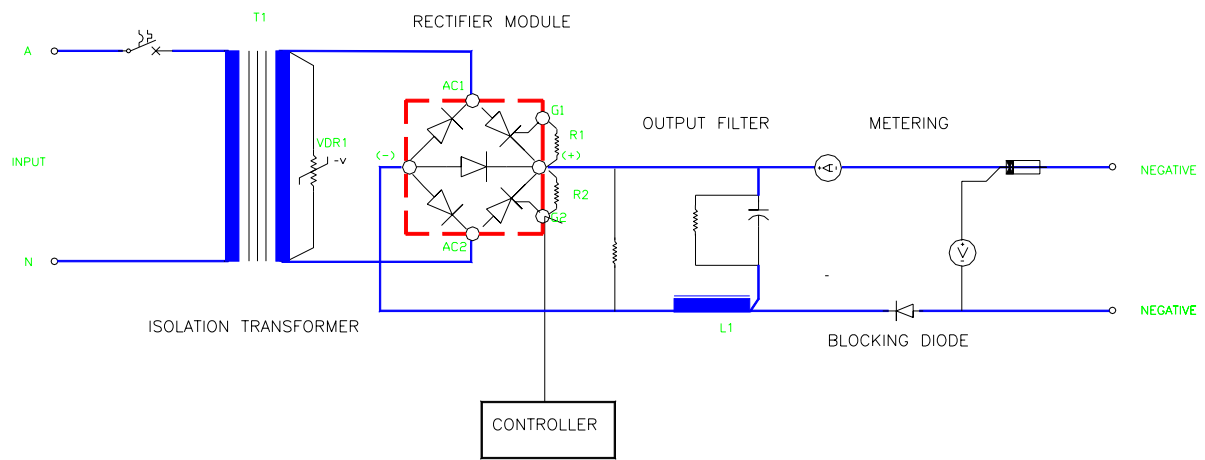
A blocking diode in the output of the charger is fitted as standard so that the battery will not backfeed into the charger and can be safely disconnected and reconnected without causing sparking. The standard blocking diode also allows easy paralleling of similar chargers.

Control of the output voltage and current is by an all integrated circuit design analog phase control, provided on a compact single circuit board which is simple to replace in service. The phase controller uses block firing techniques to give the charger control circuits maximum immunity from input waveform distortion, e.g. high impedance supplies such as generators, whilst the analog design makes fault finding simple and also keeps down the cost of spares.

Three phase chargers feature a 6-pulse full control of the thyristor rectifier bridge to provide increased efficiency and very low ripple in high power applications. The fully controlled bridge provides stability over the whole load range and does not show any 'pulsing' at light loads.

All chargers are of the constant voltage type with a static output voltage stability of 1% of float voltage, with a load variation of +/-10%. The chargers have electronic current limiting, variable from 80% to 110% which, combined with the output inductor, enables the chargers to withstand extreme output overloads down to short circuit conditions.

AC ripple output of these chargers is less than 2% RMS/DC on resistive loadings and is typically less than 1% RMS/DC when a battery of four times the charger current capacity is connected.



Single phase charger block diagram

Protection

D5542 chargers are fitted with a primary thermal magnetic circuit breaker which protects the active line(s). The circuit breaker is compensated for operation over a wide range of temperatures.

Three phase configurations are fitted with a 3-pole temperature compensated circuit breaker. Three phase units are also provided with additional protection by means of a phase symmetry relay, which completely prevents the charger from operating even if a “phantom” phase occurs when an input phase is missing or low voltage.

The DC output of the charger is protected by an HRC fuse mounted in a safety shrouded holder, or in the case of units of more than 100A capacity, mounted internally in a removable holder on the panel of the charger..

Control

D5542 chargers are fitted as standard with an automatic voltage controlled Boost feature to allow rapid recharge of the battery. The automatic boost feature senses the battery voltage and initiates a current limited boost charge when the battery voltage falls below approximately 90% of the float voltage.

Automatic voltage sensing then returns the charger to the float mode when the boost voltage is achieved. A Manual Boost Initiate switch allows the user to start the boost cycle and this boost feature can be disabled for valve regulated batteries.

Instrumentation

The D5542 range has as standard a DC voltmeter that indicates battery voltage and a DC ammeter which indicates the charge current. Normal meters are of the jewelled moving coil type, are rectangular in shape, feature 70mm scale lengths and have a Class 2 accuracy to AS 1042.

Monitoring

Local LED indication is provided for the following functions:

- | | |
|-----------------|-----------|
| 1. AC ON | Green LED |
| 2. BOOST ON | Amber LED |
| 3. BATTERY HIGH | Red LED |
| 4. BATTERY LOW | Red LED |
| 5. CHARGER FAIL | Red LED |

The indicators are self resetting in the standard configuration. Remote “voltage free” changeover relay contacts are provided for each of conditions 3, 4 and 5. Each relay is rated at 250V 3A AC or 24V 3A DC, and the alarms are self resetting (optionally latched).

Options

The D5542 charger range can be fitted with a comprehensive range of additional Control, Alarm & Monitoring features, listed below.

Control Options

- Timed Autoboot Controller, type C2191.5

This unit controls the delivery of the Boost voltage for a predetermined time or until such time as the charger reaches its boost limit volts and reverts to float.

- DC Output Control Panels

Output distribution boards using circuit breakers or fuses can be fitted to the charger cabinet. (These can also be supplied separately.)

- Automatic Paralleling Compensation

The voltage regulation of the charger is reduced as the load increases, thus allowing accurate load sharing with identical chargers.

- Battery Current Limiting facility

The current in the battery can be monitored by a separate sensing circuit on the control card so that the battery current is limited to a lower value than the total charger current. This option is especially recommended for the recharge of lead acid batteries with peak current limitations.

- Low Output Ripple

The output filter can be designed to give output ripple as low as 0.1%, for use where AC ripple must be kept to a minimum.

Alarm Options

- Earth Fault alarm, type C2191.3.

A centre tapped high impedance earth fault network indicates if the charger output circuitry has a fault to earth. This type of unit is commonly specified on emergency lighting systems.

- Battery Low Volts Disconnect

A fully rated DC relay unit disconnects the battery from the load before the voltage reaches a point where the battery may be damaged. Commonly fitted with sealed lead acid battery systems where prolonged discharging may occur.

- Low Electrolyte alarm, type C2191.3

A high impedance sensing circuit for use with flooded cells, which will, with an appropriate probe fitted to the battery, indicate if the fluid level is low.

- Charger High Volts Shutdown

Chargers can be fitted with a high voltage shutdown to prevent battery or connected load damage in the event of control failure.

- AC Supply Failure alarm

This alarm indicates that the AC supply has failed. Commonly specified and fitted to chargers fed from a 3-phase supply.

- Fuse Blown or Component Fail indicators

Chargers may be fitted with an alarm which indicates that critical fuses have failed or that semiconductor protection fuses may have failed. May be specified for remote installations.

- Battery Impedance Monitors, type D5395.

This unit actually measures the impedance of the battery by taking a precise current sample and determining the volt drop. It is suitable for single phase chargers and especially recommended for critical applications and remote monitoring.

- Battery Load Test facility

A manual test switch enables the user to load the battery momentarily and check its performance under load.

- Over Current alarm

Similar to the over volt alarm, this alarm may be used to indicate charger status.

Monitoring Options

- Digital or High Accuracy Analog meters

Both digital meters (3½ digit) or high accuracy analog meters can be provided as options. Metering for AC input voltage, AC input current and battery current can be provided. Expanded scale metering is another option.

- 4-20mA Transducer Outputs

Isolated 4-20mA current loop transducer outputs can be provided to allow continuous and remote monitoring of voltage and current with a suitable interface. The transducers can be provided scaled over a wide range and are battery powered to allow data collection when ac supply is not available.

- Alarm Annunciator, type D5615

Chargers may be fitted with an internal 8 (or more) channel annunciator panel which may combine charger alarms with other customer equipment, thus providing considerable equipment and installation cost savings to the customer. The D5615 unit is microprocessor controlled and thus can offer flexible relay functions.

Special Construction Requirements

Special requirements are, for example, often needed where chargers must operate in arduous environments. This may require the use of special materials, finishes or additional cooling or environmental protection.

A selection of the special features we can provide include:

1. Special paint finishes.
2. Special enclosures such as aluminium, stainless steel or high impact plastics.
3. Special wiring types such as non standard colours and numbering, etc.
4. Special fabrication for high temperatures or halogen free wiring.
5. Individually designed enclosures to accommodate perhaps two chargers on a changeover basis and withdrawable battery banks.