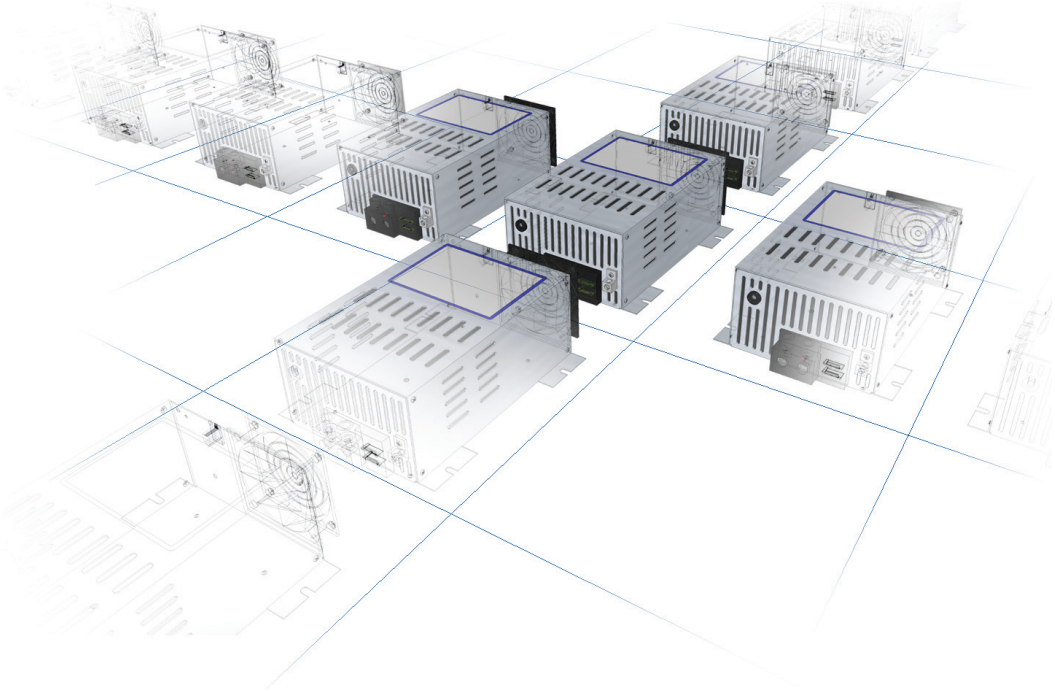
Best Solutions for Series and Parallel Charger Installations

Utilizing multiple chargers for increasing voltage or amperage



Content Highlights

A common application for multi-charger systems is in specialty vehicles

Custom charging configurations can consist of multiple chargers arranged in either series or parallel configurations (or a combination of both) to increase output voltage or capacity.

Series configurations may be used to increase output voltage of the chargers to match the voltage of the battery and when space constraints require a custom charging design. When the DC voltage requirement is greater than the charger's output voltage, chargers of the same voltage can be connected in series with each charger adding to the total output voltage, increasing volts with no effect on amps. For example, four 12V 55-amp chargers connected in series totals 48V 55-amps.

Parallel configurations are utilized when more capacity is required than the capacity of a single charger. Chargers of the same voltage connected in parallel will increase amps with no effect on volts. For example, four 12V, 55-amp chargers connected in parallel totals 12V, 220-amps.

Refer to Page 3 for typical wiring configurations for DLS chargers in series or parallel charging applications.

Common Application of Series and Parallel Configurations

Operators of emergency response vehicles, mobile command posts, and mobile medical units depend on the performance and reliability of their auxiliary batteries. Parallel and series battery charging is often used in these specialty and highly customized mobile applications where auxiliary battery operation is mission critical to powering onboard communications, medical equipment, computers, and lighting without depleting the starting batteries.

These types of applications can have unique and demanding charging current and charge time requirements to meet power supply and design needs. In many mission critical mobile applications, parallel charging is used more often than series charging because it better meets charging capacity and redundancy requirements. Careful consideration should be given to utilizing a series configuration for mission critical operations* since the series is vulnerable to a single point of failure.

Parallel charging – when multiple chargers work together to deliver more capacity – is common in applications requiring hundreds of amp-hours from the batteries to run communications, lights, and other electronic equipment. Parallel charging also offers redundancy, which is an advantage to series configuration in mission critical operations. Series and parallel connections can also be used together in nearly limitless combinations to meet specific charging requirements.

Built-in Controllers Can Fight in Multi-Charger Configurations

The performance and life of the auxiliary batteries depend on maintaining full charge and not undercharging or overcharging. Undercharging and overcharging both contribute to decreased performance and shorter battery life.

Today's smart chargers – chargers with built-in controllers – automatically apply the correct voltages during multi-stage charging: bulk, absorption, float, and equalization. Correct application of the charging stages will maintain a battery at full charge, balance undercharging and overcharging for best performance and long battery life. In multiple charger configurations, automatic controls are even more important, especially in series connections where overcharging is a potential hazard.

While smart chargers deliver clear charging benefits, multi-charger applications can present challenges to chargers with built-in smart charge control technology. In this case, the charge controller manages the individual charger when the purpose of the series or parallel configuration is for the chargers to work together for total increased output voltage or increased amps. Chargers with built-in controllers can interfere with each other in their various charge stages of bulk, absorption, float, and equalization and the batteries may not reach full charge. In operations where auxiliary battery power is mission critical, chargers with built-in controllers can contribute to decreased battery performance and battery life.

For this reason, it is recommended that charge control options are not applied to chargers when used in series or parallel charging applications. For further details for these applications, contact Customer Service.

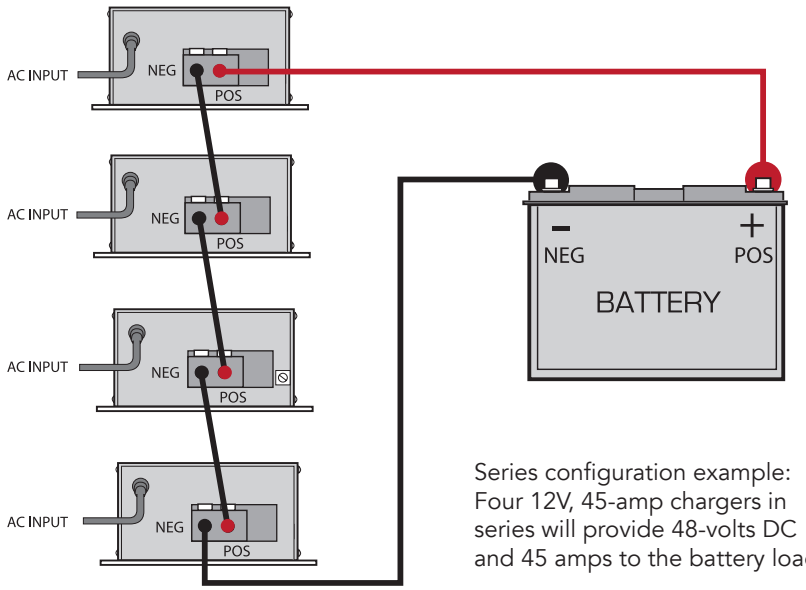
*See IOTA Life Support Policy on Page 4

Illustrations 1 and 2:
Typical wiring configurations for multi-charging systems.

Series Configuration

This illustration demonstrates a typical series configuration system. When the battery chargers are connected in series, the system delivers increased output voltage (*output voltage* x *number of chargers*) but no change in amperage.

Illustration 1

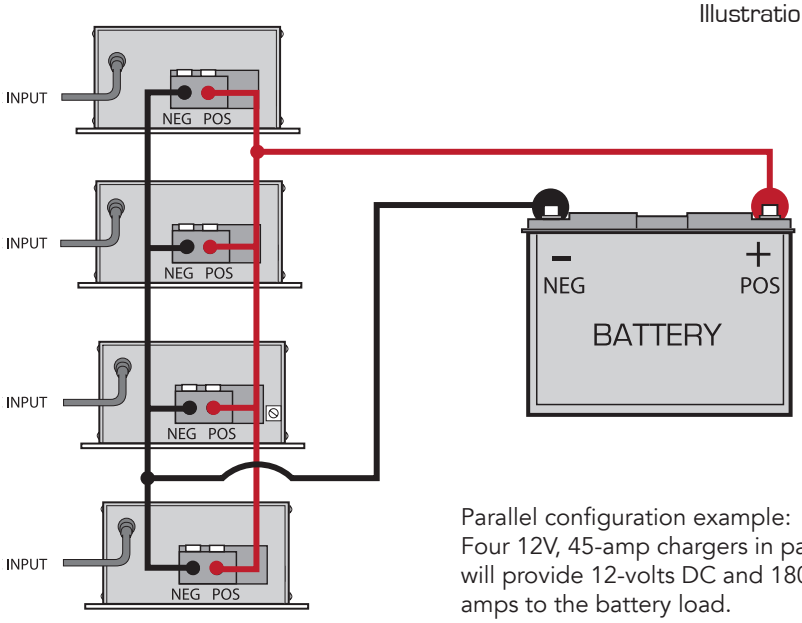


Series configuration example: Four 12V, 45-amp chargers in series will provide 48-volts DC and 45 amps to the battery load.

Parallel Configuration

This illustration demonstrates a typical parallel configuration system. When the battery chargers are connected in parallel, the system delivers increased amperage (*amps* x *number of chargers*) with no effect on the output voltage.

Illustration 2



Parallel configuration example: Four 12V, 45-amp chargers in parallel will provide 12-volts DC and 180 amps to the battery load.

Explore Your Options

The IOTA DLS product line offers a versatile selection of output voltages and amperages for power conversion and battery charging applications. The Series and Parallel Operation capability of the DLS expands these applications to include an additional level of voltage and amperage possibilities.
You can explore the available IOTA DLS Models at **www.iotaengineering.com**.

About IOTA Engineering

IOTA®, an Acuity Brands® company, has worked continuously in the electronic R & D field, designing and manufacturing innovative products for the lighting and electronics industries since 1968. Initially focused on the development of low voltage solid state ballasts, IOTA has expanded to include emergency battery packs for contemporary lighting designs, DC inverter ballasts, and AC/DC power converters and battery chargers. The company is a leader in developing technology for reliable chargers for specialty battery charging and power conversion applications. IOTA is continually expanding its development of state-of-the-art electronics that keep pace with customer needs and industry demands. From the circuit board design to the completed unit, IOTA designs and develops products that maintain superior performance, and is dedicated to providing the highest levels in customer satisfaction, quality and innovation in the industry.

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