

NEW LITHIUM BATTERY CHARGER!

INTELI-POWER® 9100L SERIES



LOW COST LITHIUM ION BATTERY CONVERTER/CHARGERS DESIGNED TO MEET STRINGENT VOLTAGES REQUIRED FOR PROPERLY CHARGING & MAINTAINING LITHIUM ION BATTERIES!

What are the advantages of lithium ion batteries?

- Stores 3-4 times the energy of a lead/acid battery in the same space, with less weight.
- Nearly constant output voltage during discharge. Delivers full power longer to all systems improving performance.
- Operates over a wide range of temperatures. -4F to +158F.
- Can charge and discharge thousands of times vs. 300-400 cycles for lead/acid batteries.
- Retains 80% of charge for 12 months, vs. lead/acid batteries, which discharge to 80% of capacity in only 30 days!
- Lithium ion batteries do not require maintenance. No more adding water. No more venting of explosive gasses!
- Lithium ion batteries are the future, providing excellent performance in golf carts, electric vehicles, solar power storage, ups power back-up systems, forklifts and many other applications.



80
AMP

MODEL PD9180L*

Input: 105-130 VAC 50/60 Hz.
1300 Watts
Output: 14.6 Volts VDC 80-Amps
Dimensions: 11.65"Lx9"Wx3.6"D
Weight: 7.5 lbs.



**Uses 20 Amp cord. Removal or alteration of converter 20 Amp power cord will void warranty.*



70
AMP

MODEL PD9170AL

Input: 105-130 VAC 50/60 Hz.
1250 Watts
Output: 14.6 Volts VDC 70-Amps
Dimensions: 9.15"Lx9"Wx3.6"D
Weight: 5.8 lbs.



PD9100L Series of Low Cost High Current 12-Volt Lithium Ion Converter/Chargers

Engineered for power-hungry applications

Standard features on all models:

- Reverse battery protection protects converters from damage resulting from improper (reverse) battery lead connection.
- Units deliver filtered DC power to the Lithium Ion Batteries to ensure their built-in electronic balancing circuits operate properly.
- Electronic current limiting automatically reduces output voltage when maximum capacity is exceeded. Protects your investment.
- Low line voltage protection automatically shuts converter down if input voltage is insufficient.
- Variable speed intelligent cooling fan automatically monitors converter temperature and activates fan at speed required.
- High voltage protection protects converter from spikes or surge of voltage over 135V.
- Automatic thermal protection reduces converter output to safe levels when unit temperature exceeds pre-set limits and protects converter from damage due to excessive heat.
- Output Voltage can be FACTORY ADJUSTED to meet OEM requirements for various Lithium Ion Battery Chemistries and Voltages. Standard "L" Series Voltages are set for 14.6- Volts to meet requirements for Lithium Iron Phosphate batteries. Other chemistries may require different voltages.
- The PD9100L Series can be wired in parallel to charge at much higher current rates. They can also be wired in Series/Parallel to charge 36, 48, 60, 72 and higher Voltage Battery packs at high charge rates.
- 2 year limited warranty.
- US Patents: 5,687,066 and 5,600,550 and 7,782,002

Model PD9160AL

Input: 105-130 VAC 50/60 Hz.
1000 Watts
Output: 14.6 Volts VDC 60-Amps
Dimensions: 9.15"Lx9"Wx3.6"D
Weight: 5.8 lbs.

60
AMP



Model PD9145AL

Input: 105-130 VAC 50/60 Hz.
725 Watts
Output: 14.6 Volts VDC 45-Amps
Dimensions: 8.62"Lx7.25"Wx4.5"D
Weight: 4.5 lbs.

45
AMP



Model PD9140AL

Input: 105-130 VAC 50/60 Hz.
600 Watts
Output: 14.6 Volts VDC 40-Amps
Dimensions: 8.62"Lx7.25"Wx4.5"D
Weight: 4.5 lbs.

40
AMP



Model PD9130L

Input: 105-130 VAC 50/60 Hz.
500 Watts
Output: 14.6 Volts VDC 40-Amps
Dimensions: 8.62"Lx7.25"Wx4.5"D
Weight: 4 lbs.

30
AMP



PD9100L Series of Low Cost High Current 24-Volt Lithium Ion Converter/Chargers

Model PD9125-24L

Input: 105-130 VAC 50/60 Hz.
900 Watts
Output: 28.55 Volts VDC 25-Amps
Dimensions: 8.62"Lx7.25"Wx4.5"D
Weight: 4.5 lbs.

25
AMP



Model PD9140-24L

Input: 105-130 VAC 50/60 Hz.
1,300Watts
Output: 28.55 Volts VDC 40-Amps
Dimensions: 11.65"Lx9"Wx3.6"D
Weight: 7.5 lbs.

40
AMP

*Uses 20 Amp cord. Removal or alteration of
converter 20 Amp power cord will void warranty.

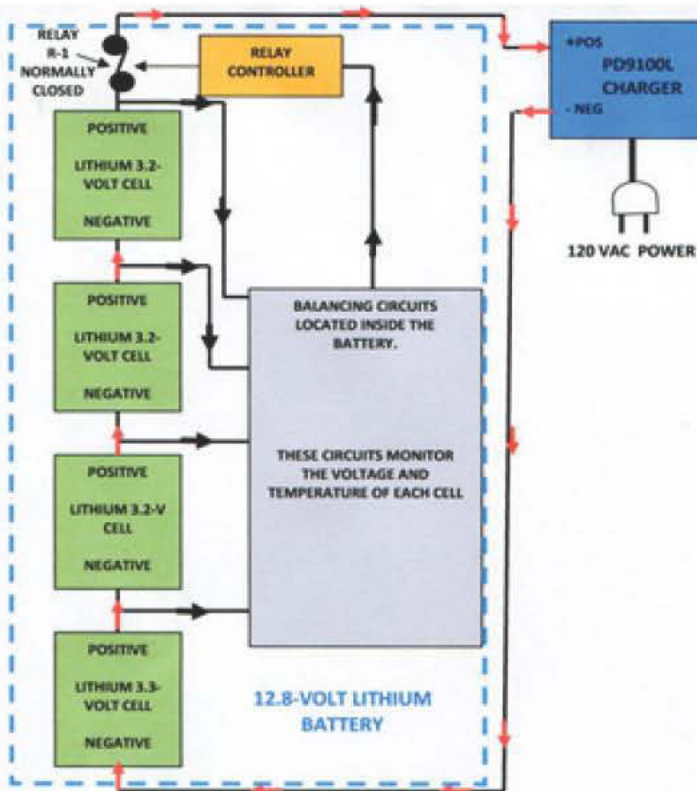


LITHIUM ION BATTERIES REQUIRE SPECIAL BALANCING CIRCUITS AND CHARGERS!

12-Volt Lithium Ion batteries are composed of 4 Cells, each with a Voltage rating of 3.2-Volts wired in series providing a total output of 12.8 Volts. *Lithium Iron Phosphate type Cells, are the safest and most common type used however, they must never be charged to a voltage over 4-Volts and must never be discharged below 2-Volts, or they will be damaged. Note: other Cell chemistries require different voltage limits.*

Due to manufacturing inconsistencies each Lithium Ion Cell is different (i.e. they will each charge and discharge at different rates). These Cell differences make recharging Lithium batteries fairly complex and requires that the battery manufacturer must install Electronic Balancing Circuits inside the battery to prevent overcharging a Cell, or discharging too much. While these Balancing Circuits protect the Cells, they can increase recharge times, depending on the mix of Cells in each 12-Volt battery pack. This increase in recharge time is especially apparent in higher voltage and or higher Current battery packs. Lithium Ion batteries also require battery chargers that can produce a higher voltage than provided by standard 12-Volt or 24-Volt Lead/Acid Battery Chargers. **Trying to recharge a Lithium Ion Battery with a standard Lead/Acid Charger will result in a partially charged battery and may REDUCE BATTERY Life!**

How Do Lithium Ion Battery Balancing Circuits Work?



The diagram on the left shows the recharge current flow (red arrows) from the Negative output of the charger through the Negative Terminal on the lower Lithium Cell. The recharge current then passes through all cells, Relay R-1 and back to the Positive Terminal of the Charger.

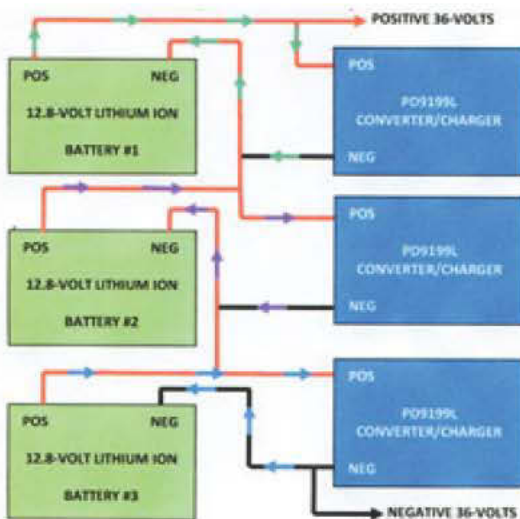
As the cells begin to recharge the Balancing Circuits constantly monitor the Voltage and Temperature. If any of the 4 Cells reach 3.9-Volts, or a High Temperature condition, the Monitoring Circuits send a signal to the Relay Controller causing the Relay Contacts to "OPEN", which turns off Charging Current to all Cells. This occurs even though the other three Cells require additional charging. The Balancing Circuits now begin to bleed off excess voltage of the 3.9-Volt cell until its voltage is slowly reduced to equal or close to the voltage of other Cells in the Battery. This Balancing can take from several minutes to several days depending on the size (Amp Hour Rating) of the battery pack and the amount of imbalance in the Cells.

Once balance is achieved a signal is sent to the Relay Controller and R-1 "CLOSES", allowing Recharge Current to again flow and continue to complete the full charge. Depending on how well the Cells are matched, typically R-1 and Balancing Circuits will continue this Charge "ON" Charge "OFF" Cycle several times before the "Full Charge Cycle" is completed. Fortunately Lithium Ion Batteries ability to recharge at very high rates helps reduce the recharge time during "Charge ON" Cycle.

During the battery Discharge Cycle the Balancing Circuits also will "OPEN" R-1, and disconnect the battery from the Load if any Cell Voltage drops to 2-Volts to prevent battery damage.

IS THERE A FASTER WAY TO CHARGE HIGHER VOLTAGE BATTERY PACKS?

Yes, there is! As you can imagine after reviewing the operation of the Balancing Circuit on the Battery Pack above, with only 4 Cells, the time required to recharge a 36-Volt Pack, with 12 Cells or more could be very long. The best and probably the lowest cost method to reduce this time for higher voltage Battery Packs is shown below utilizing three 12-Volt PD9100L Converter/Chargers, providing an individual charger for each battery.



The diagram on the left shows how to wire THREE 9100L Series Converter/Chargers to a 36-Volt Battery Pack to achieve faster recharge times. Connecting an individual Charger to each Battery provides individual charging paths for each Battery (see different colored arrows). This means for instance that if a Cell in Battery #2 reaches the cutoff voltage of 3.9-Volts it will disconnect only its Charger, while Batteries 2 and 3 will continue to charge. The higher the Battery Pack Voltage the more time will be saved using this charging method.

What about costs? Progressive Dynamics manufactures over 100,000 chargers a year, which allows PDI to provide OEM's (Quantities of 1000-up) a three charger 30-Amp 36-Volt system for less than \$250. A 60-amp 36-Volt system for OEM's would be less than \$300.

OEM's can E-mail sales@progressivedyn.com or pdwest1@aol.com to request a quote and or an evaluation sample. Distributors may also contact us for a quote.



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