

High Performance Batteries Lithium Iron Phosphate (LiFePO4)

Congratulations on your recent purchase of race timing equipment from RaceAmerica. This equipment contains high performance lithium ion batteries. This document provide guidance to optimize Lithium Ion batteries for years of use.

BACKGROUND

High performance Lithium Ion (Li-Ion) battery technology is quite different from other battery technologies. Li-Ion batteries can retain higher charge capacity in a smaller and lighter package. There is no memory to the Li-Ion battery to contend with but Li-Ion does have one drawback, they are more sensitive to misuse. Care must be taken to avoid overcharging and draining the batteries to avoid permanent damage. The equipment using Li-Ion batteries contains protection circuitry to reduce the chance of misuse. In conjunction with preventative care, the chance of permanent damage to the batteries is eliminated.

FACTORY BALANCE CHARGE

SLA batteries generally consist of multiple 2.1VDC cells to provide higher voltage for normal use. A 12VDC SLA battery contains six 2.1VDC cells. When charging the SLA battery, each cell will charge to a maximum level, then share the remaining charge with adjacent cells until all cells are fully charged. Li-Ion battery packs in the T-Link2 are similar combining three 3.2VDC LiFePO4 battery cells to achieve the 9.6VDC rating. Li-Ion battery packs charge differently than SLA batteries. Individual Li-Ion batteries are selected and combined at the RaceAmerica factory, then discharged together as a set. The set is then Balance Charged to full capacity. Since Li-Ion batteries do not have an internal charge point limit, an external balancing circuit is used to force the battery pack to charge each individual cell to its maximum capacity relative to the other cells in the battery pack. The initial balance charge is required to condition the cells to charge and discharge together insuring longer lifetime and higher capacity of the Li-Ion battery pack.

CHARGING

Use only battery chargers designed for Lithium Ion batteries. This type of charger is designed to match the charging characteristics of the Li-Ion battery. Li-Ion chargers are available in several voltages and must match the voltage of the battery pack. Using a non Li-Ion charger will damage the Li-Ion batteries reducing their ability to charge to full capacity. Using a charger rated at a voltage different than the battery pack, both lower and higher voltage rating, will cause permanent damage to Li-Ion batteries.

Charge the batteries after each use. Li-Ion batteries will bleed off the charge slowly over time. This is not a 'charge memory' issue like other rechargeable batteries, it is the nature of Li-Ion battery batteries to bleed off some level of charge. The longer

the batteries remain unused, the more the charge is reduced. Prior to next use, connect the charger to top off the charge.

Li-Ion batteries are unlike Sealed Lead Acid (SLA) batteries when trickle charging over periods of time. Li-Ion batteries can be overcharged if left on the charger for an extended period of time causing damage to the battery cells resulting in shorter overall lifetime. Discontinue charging when the charge LED indicator turns green indicating the Li-Ion batteries are at their recommended charge capacity.

STORAGE

Store your timing equipment containing Li-Ion batteries in a cool, dry place. Elevated temperatures increase the slow loss of charge and low temperatures decrease the charge capacity of the batteries. Extreme temperatures, high or low, can cause permanent damage to the Li-Ion chemistry of the battery.

If batteries are to be stored for an extended period of time, top off the battery charge every 30 days as described under charging above. This insures the charge does not drop below minimum levels and will require a short period of charge compared to charging after use.