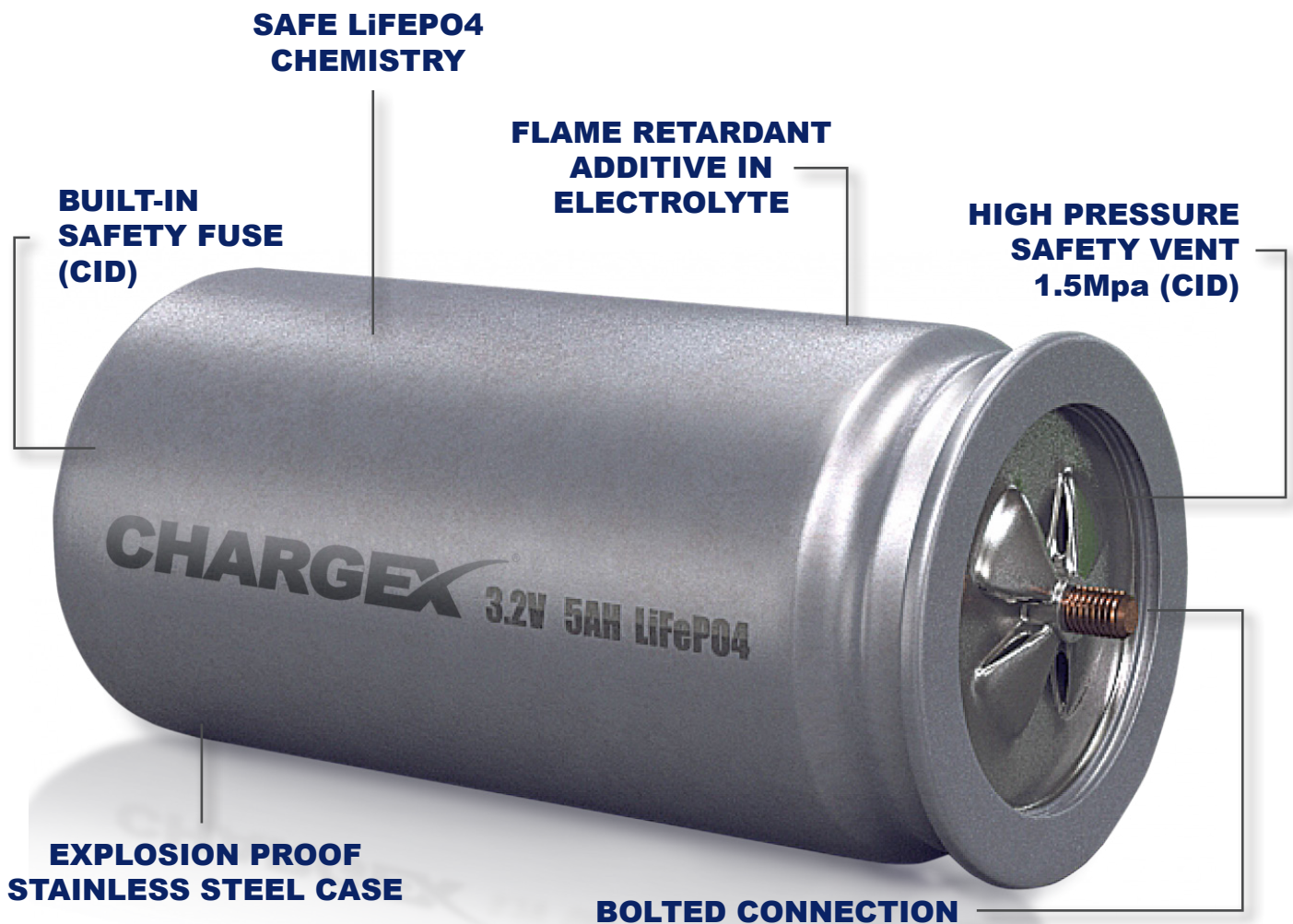


### CELL SAFETY

The biggest issue with all lithium batteries is cell overheating and rupturing due to over charging. CHARGE<sup>®</sup>X Lithium Ion Battery Systems have several layers of safety redundancy at the cell level. Notably, an internal thermal fuse between the anode and cathode which shuts down the cell before overheating occurs, preventing pressure build-up. In the event that the battery is consumed by fire or is exposed to temperatures in excess of 135°C, the separators passage for the ion will close and no longer flow.

The same situation applies for external protection. When the internal air pressure is over 1.5Mpa, the air vent will flip over, the CID will detach, and the close circuit breaks - causing the ion to no longer flow.



### CLASS A CELL SAFETY & DESIGN

The biggest issue with all lithium batteries is cell overheating and rupturing due to over charging. CHARGEEX<sup>®</sup> Lithium Ion Battery Systems have several layers of safety redundancy at the cell level. Notably, an internal thermal fuse between the anode and cathode which shuts down the cell before overheating occurs, preventing pressure buildup. In the unlikely event the internal fuse fails, pressure releases through a 1.5Mpa safety vent to the cell's electrolyte composition that includes a highly effective flame retardant additive.

These conditions would likely only occur if a charger or controller failed - spiking current into the battery. The Battery Protection System (BPS) is designed to protect the cells from this anomaly by opening at 15.8V in a 12V system and would have to fail in the closed state allowing excess current into the cells.



### FLAME RETARDANT

CHARGEEX<sup>®</sup> cells are safety guarded with a flame retardant additive in the electrolyte of the cell for the best safety.



### BUILT-IN SAFETY FUSE

Our latest cell technology has a built-in thermal safety fuse between the anode and cathode that breaks in the unlikely event of overheating.



### SAFETY VENT

Our high pressure safety vent will flip open to release energy and prevent explosion if exposed to extreme heat.



### EXPLOSION PROOF

With the highest quality metal, every cell is manufactured in an explosion proof, stainless steel cylindrical case.

### CHARGEEX<sup>®</sup> CLASS A CELL ADVANTAGES:

- SAFE LiFePO4 CHEMISTRY
- LONG LIFE CYCLE (5,000+ CYCLES)
- HIGH POWER & DEEP DISCHARGE
- BOLTED CONNECTION
- BATTERY PROTECTION SYSTEM (BPS)
- OVER TEMPERATURE PROTECTION
- BUILT-IN THERMAL FUSE
- HIGH PRESSURE SAFETY VENT
- EXPLOSION PROOF STAINLESS STEEL
- FLAME RETARDANT ADDITIVE IN THE ELECTROLYTE



### PACK TECH LENGTHWAYS

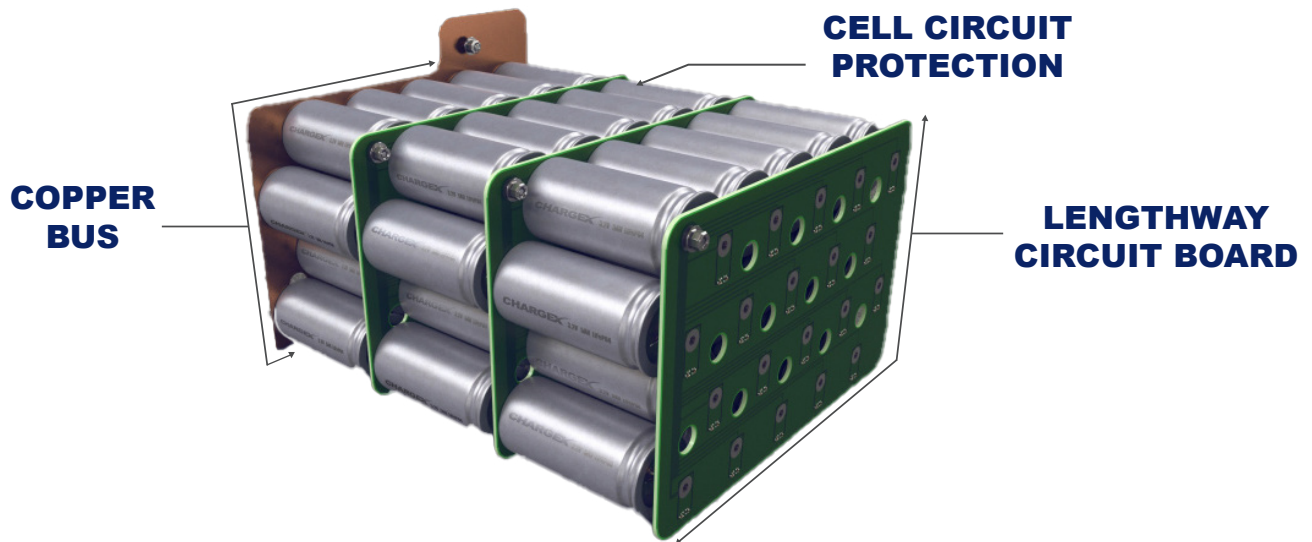
Our Lengthway Circuit Boards have a unique function of overcurrent and cross protection. The cells are bolted through the Lengthway Circuit Boards providing balance, even current flow, and short circuit separation.

### COPPER BUS

Both ends of the module are built with the same design on the assembly structure so that charge and discharge are at the same lengths.

### CELL CIRCUIT PROTECTION

If the battery is penetrated by bullets or lodged metal from an accident, the circuit board will separate the impacted cells from the rest of the cells allowing the battery to continue functioning with less capacity.



### BOLTED DESIGN PROVIDES:



#### STRENGTH & DURABILITY

The positive and negative of the cell are welded to the pillars and tightly connected with bolts and nuts.



#### ELECTRICAL CONDUCTIVITY

Very low impedance with high current capability, cells are evenly divided with spacing for good heat dissipation.



#### RELIABLE & SHOCK RESISTANT

After the Shock and Vibration Test, the bolted design had no mechanical damage or looseness of the battery pack.

### PATENT PENDING CIRCUIT BOARD

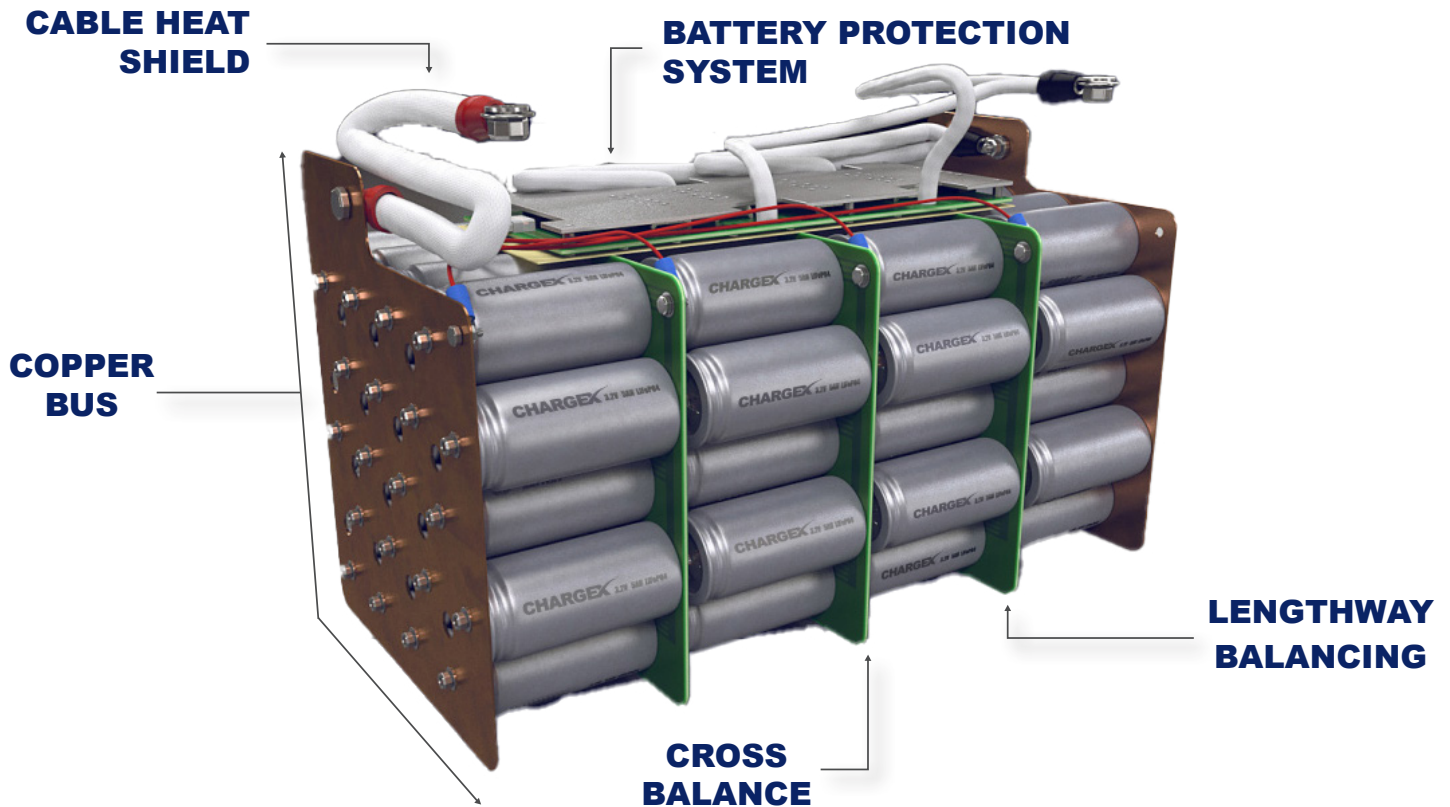
Our printed circuit board (PCB) is designed with functions of cross balance, lengthway current, and multiple functions of cell protection. This design has been applied for International Patent of Invention.

### PCB BOARD FUNCTION

In the event of balancing, overcurrent, short circuit, reverse polarity, or under/over voltage, the PCB board can disconnect power to the terminal post - protecting the lithium ion cells from damage. After the fault condition is removed, the PCB will automatically reconnect for normal operation. In the event of a low voltage shut off, the PCB will reconnect with a charge current.

### BALANCING

During charging the PCB board will provide up to 2A current through the lengthway circuit board - which is lower voltage than the other lengthway boards. Tests show that the cells are so precisely matched and batched together with high conformity and passive assembly design that the balancing function will remain inactive for most of the battery life.



### GENERATION 2

- Cells are bolted together for strength and electrical conduction
- Long cycle life for over 5,000 cycles
- After 4,000 cycles, the battery will still have 80% of its original capacity
- Ratio of weight against energy is 130Wh/kg
- Performance ranks among the best in the world - Class A

### 4 WAY PROTECTION DESIGN

1. The diaphragm shuts down the inner ion while the cell is at a high temperature.
2. If the cell casing has high internal pressure, the positive and negative current will cut off.
3. If the internal pressure is over 1.5Mpa, the valve discharges.
4. Cells are safeguarded with a flame retardant additive in the electrolyte.

### CELL MATCHING PROCESS

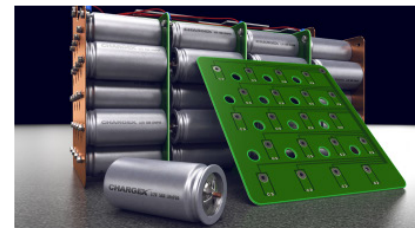
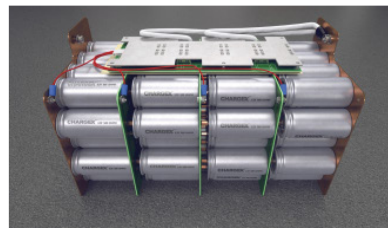
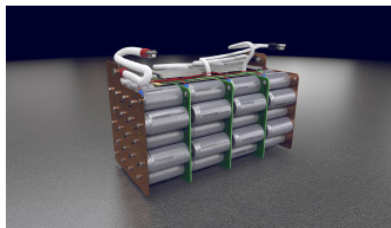
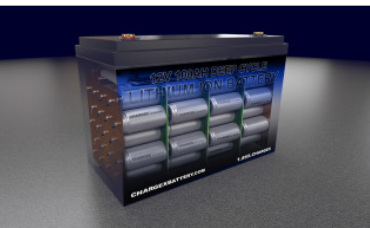
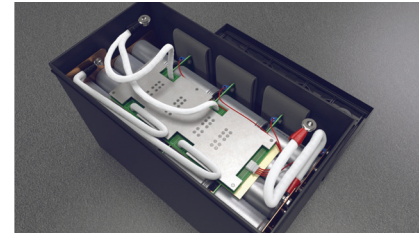
When assembling multiple cells together (either in a series or parallel) we match and group cells together based on 10 consistencies:

1. Self Discharge
2. Voltage
3. Inner Impedance
4. Capacity
5. Cycle Life
6. Platform
7. Constant Current Rate
8. Cell Power Control
9. Parallel Module Control
10. Finished Battery Control



### CHARGE<sup>®</sup>X INTERNAL BATTERY PROTECTION SYSTEM

Our EnergyWave Internal Battery Protection System (BPS) automatically turns the battery off if it's drained below 8V or charged above 16V - preventing accidental over-discharge. The BPS will turn the battery off by sensing a short circuit, reverse polarity, over and under voltage, as well as, over current. Our BPS maximizes the efficiency and performance of the battery to increase its cycle life.



### KEY SAFETY FEATURES:

Safety is of the utmost importance with our 4-Way Protection Design. Made from the highest quality metals with stainless steel internal parts, each cell has an internal safety fuse, high pressure safety vent, explosion proof casing, and flame retardant additive.



**BUILT-IN SAFETY FUSE**



**FLAME RETARDANT ELECTROLYTE**



**HIGH PRESSURE RELIEF VALVE**



**EXPLOSION PROOF**

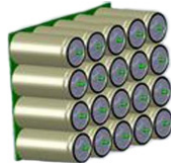
### ASSEMBLY INSTRUCTIONS

1. Series four 3.2V 5Ah cells to create 12.8V 5Ah nominal
2. Create parallel connection to build capacity (3.2V 100Ah)
3. Combine parallel bus into a series creating 12V 100Ah

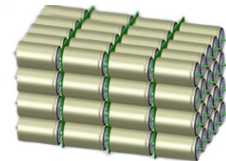
**1.**



**2.**

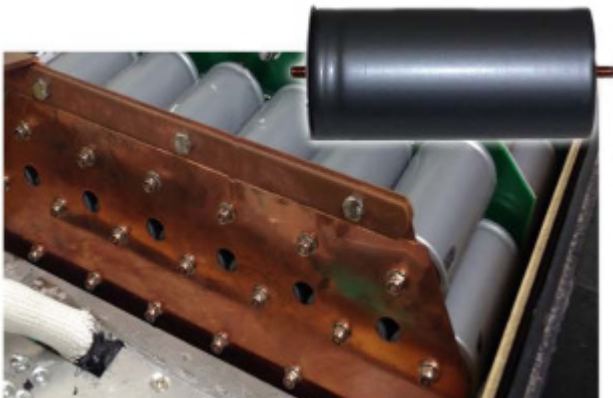


**3.**



### FIRM

The cell's positive and negative are welded to the pillars and connected tightly with nuts.



### PASSIVE CIRCUIT BOARD

The structure has a unique function of lengthways overcurrent and cross protection which protects each cell.

