Lithium Modular Battery Pack

E0120A-24V

E0120A-48V up to 1MW
eCAMION was established in 2009 to design and engineer Lithium-Ion Battery Packs. In 2009, eCAMION Inc. was established and patents (pending) were filed. The patents (pending) filed were based on eCAMION’s Thermal Management System and eCAMION’s Manufacturing Processes. The founders of eCAMION Inc., former General Motors and Delphi Battery employees, have over 30 years experience in Battery and Manufacturing Technology. eCAMION designs and manufactures lithium battery packs for any application that requires superior power performance. eCAMION also designs and builds its own manufacturing equipment to build the packs, a great advantage to improving quality, cost and delivery.

The major challenges faced by existing lithium-Ion battery technologies are:

i) controlling the heat generated, which can shorten lifespan

ii) reducing the high cost of producing reliable batteries.

eCAMION’s technology has the following three main benefits over incumbent technologies:

1. The Thermal Management System is designed to reduce heat, maintaining a lower overall core temperature and increasing battery life. Conversely, the Thermal Management System will allow the battery to operate in extreme cold conditions were cells would typically give poor performance (i.e. <-30 deg. celsius)

2. Materials are used to bind the lithium-ion cells together within the battery packs, replacing conventional welding or clamping, which reduces the weight to volume ratio.

3. eCAMION’s battery packs are designed with up to 60% less components to enable lower cost production by 30%.

eCAMION Inc. was established in 2006 to produce its lithium battery pack thermal regulation and battery management system technologies. eCAMION’s patent-pending design has been developed based on years of experience of its founding members designing and manufacturing energy-saving, environmentally-friendly lithium battery packs on a large scale within the automotive, solar and wind energy storage industries.

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Flexible Design allows for Small and Large Capacity Battery Packs
- 5Ah to 100 Ah Lithium Cells
Applications include:
Med: Bicycle, Wheelchair, Racing vehicles, Portable Equipment
Large: Electric Vehicle, Hybrid Electric Vehicle, Plug-in Hybrid, UPS
Excavator, Tractors, Marine, Military, Unmanned Vehicles, Telecom
E-Large: Hybrid Power Plant, Solar & Wind Energy Storage Systems

Specializing in Thermal Management of Battery Pack
Specializing in Modular Design

Battery Pack Manufacturing
Design and Manufacturers of Automated Equipment to assemble Battery Packs
("NO-TOUCH" features)
- cell stacking automation
- cell insertion automation
- cell joining automation
- pack assembly automation
- automated pack testing

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Modular Battery Pack Innovation

eCAMION’s Modular Battery Pack design allows a variety of different applications with the same “standard” pack. Having the flexibility of various applications within one company allows a cost-effective solution to Design Engineers. Scaling up or down is accomplished without additional costs in tooling/engineering. To achieve the best costs, the standard battery pack is designed and added on until the requirements are met.

Thermal Management System Innovation

eCAMION’s Thermal Management System is comprised of two main parts. The first is the Battery Management System (BMS). eCAMION has designed and manufactured its own circuit board for each battery pack it builds. This gives us the ability to tailor each pack to the specific needs of each customer. Just some of the characteristics that are monitored by eCAMION’s BMS are;
- State of Charge (SOC), Voltage, Current, Temperature
- cell temperature, cell balancing
- voltage cut-off, emergency cut-off
- communication interface via CAN-bus or RS232

The second part of eCAMION’s Thermal Management System is the integrated cooling/heating passages within the outer case of the battery pack. This is a patented (pending) design. The outer case has been designed to have fluid flowing at close proximity to the cells to maximize thermal exchange whether the need is to cool or heat the cells. The purpose is to keep the cells at their optimal temperature range to maximize their life. Maximizing a cell’s life will decrease life cycle cost and allow the pack to operate longer than is typical in the industry today.
eCAMION produces the highest quality Lithium Modular Battery Packs at competitive cost. This is accomplished by designing the modular system with the manufacturing process in mind. eCAMION’s Design Engineers have extensive manufacturing experience (30+ years) which has enabled them to design each component of the pack with quality processes and high production volume in mind.

Processes, such as, cell insertion and cell joining have been taken into account in the design of the packaging and layout of the modular pack. This enables superior quality. eCAMION’s pack design has up to 60% less components than its competitor. As well, eCAMION is utilizing a “state-of-the-art” joining method that allows the entire tabs’ surface area to be joined. The quality advantages are obvious when the modules are manufactured.

Other key factors in producing a superior quality product is that quality checks are introduced at each step in the manufacturing process to ensure that the highest quality standards are met. Automation is also key in the eCAMION process. eCAMION’s engineers recognize that automated handling of the cells is key to superior quality.

Manufacturing equipment is a key to the success of the manufacturing process. eCAMION designs and builds its own processes. Their extensive knowledge and experience in building automation equipment allows the highest quality and production at a competitive cost. Highly automated equipment also ensures consistent performance characteristics from module to module.
## Pack Models and Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Dimensions (mm)</th>
<th>Application</th>
<th>Mass</th>
<th>kWhr</th>
<th>Cells (Ahr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 Ah - 18V</td>
<td>260 x 64 x 277</td>
<td>Small Vehicles</td>
<td>*</td>
<td>0.558</td>
<td>31</td>
</tr>
<tr>
<td>48Ah - 24V</td>
<td>240 x 44 x 224</td>
<td>Homes, racing cars</td>
<td>*</td>
<td>1.152</td>
<td>16</td>
</tr>
<tr>
<td>120Ah-24V</td>
<td>300 x 292 x 251</td>
<td>Vehicles, Yachts, Wind/Solar</td>
<td>*</td>
<td>2.88</td>
<td>40</td>
</tr>
<tr>
<td>120Ah-48V</td>
<td>530 x 292 x 251</td>
<td>Vehicles, Yachts, Wind/Solar</td>
<td>*</td>
<td>5.76</td>
<td>40</td>
</tr>
<tr>
<td>180Ah - 12V</td>
<td>350 x 288 x 244</td>
<td>Back up Power, Wind/Solar, Flood Lighting, Wells</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400Ah - 12V</td>
<td>508 x 300 x 250</td>
<td>Boats, Racing Boats, Yachts</td>
<td>*</td>
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<td></td>
</tr>
<tr>
<td>400Ah - 200/400V</td>
<td>914 x 762 x 280</td>
<td>Cars, trucks, buses</td>
<td>*</td>
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<tr>
<td>450Ah - 48V</td>
<td>460 x 406 x 291</td>
<td>Military</td>
<td>*</td>
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<tr>
<td>1 MW</td>
<td>9.8 cubic metres</td>
<td>Hybrid power plants</td>
<td>*</td>
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</tr>
</tbody>
</table>

Contact Factory

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Battery Management System

eCAMION designs and builds its own BMS boards to provide our customers with the flexibility required for their specific needs. As different cell chemistries have different characteristics, we can alter our BMS to perform to ensure proper battery operation (charging/discharging, etc.) under these conditions. In addition, during factory setup, we can implement specific customer requirements.

eCamion’s BMS provides a high level of functionality as listed below.

12 cell voltage measurements
12 temperature measurements for pack monitoring
1 current measurement
State of Charge Calculation
Cell equalization/balancing (passive and active control)
Relays with output for protecting the battery from over charge/discharge
Communication flexibility as per customer requirements (communication via CANBus, ethernet) i.e. data monitoring/logging and parameter setting

eCAMION’s BMS is truly flexible and can also be purchased as a stand alone system for customer specific needs.
eCAMION Battery Pack Performance

eCAMION’s Battery Pack design has enabled the cells to maintain their desired temperature. eCAMION’s Thermal Management System coupled with the BMS, the temperature is maintained at the optimal “cell” temperature. That is the range in which the cell will maximize its life. Higher life cycle equates maximizes overall cost competitiveness.

eCAMION’s Battery Pack design not only takes into account cooling but has heating characteristics where the climate dictates that heating is necessary to reduce the risk of the cells freezing, increasing performance.
Battery Pack:
Zero Emissions
Maintenance Free
Cycle Life >10 years *
Operating range -40C to 60C*
Modular Design
Cost Competitive Design

*using eCAMION's Thermal Management System

Cells: Lithium**
Fast rechargeable up to 3C
Continuous 20C discharge with 40C pulse
High Energy Density Cells at 200 Wh/kg
High Power Density Cells at 1800 W/kg

** can be customer chosen

Lithium Modular Battery Packs

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