

Electric Vehicle Battery Pack

This project is a battery pack for a two wheeled EV using battery modules from a Nissan leaf. The total design is low maintenance and high output to meet the demands of an electric vehicle.

Key Features:

- 72v output
- 3kw/hour capacity
- 4.32 kw max output
- 9 modules (18 cells)
- Li-ion cell chemistry
- BMS
- Fuse / Disconnecter
- Passive thermal design
- Compact height



Performance:

The design requirements were based off the repurposed alternator that is being used as a motor for the EV.

The motor is rated for 2.88kw at full power so while the modules could supply significantly more power than required, the design for this battery pack is limited to 4.32kw max output.

The major limitations on the final design is the BMS's 60A (max) rating and the fuse we have chosen.



Safety:

- Low thermal activity
- Electronic voltage and current protection
- Mechanical over current protection
- Safety interlock
- Minimal electrical connection required when fitting or removing the battery pack in the vehicle.

Thermals:

Some EV's have to have complex active cooling for their battery packs, we got around the complexity of an active cooling system by:

- Using pouch type cells that have superior heat dissipation vs cylindrical cells.
- Drawing significantly less current than the cells were rated for (1.5C).
- Thermal monitoring of the cells with the BMS reducing output if temperature increase exceeds 45 degrees.



Physical Construction:

The size and placement of the battery pack in the vehicle were a key constraint.

The busbars and their plastic housings from the original Nissan leaf were modified and re-used.

The Metal brackets and spacers that hold the modules together were also reused from the original battery pack. The bottom metal plate was cut in half and welded back together.

The pack is mounted to the EV with two bolts. The overall size is L 780mm x H 192mm x W 222mm.



BMS Features:

- Over current protection
- Over voltage protection
- Over charge / discharge protection
- Cell balancing
- Thermal monitoring
- Bluetooth monitoring via app

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Kent Marshall
Kevin O'Neill
Levi Marshall
Nicholas Anderson
Callum Macleod