

## QUICK START

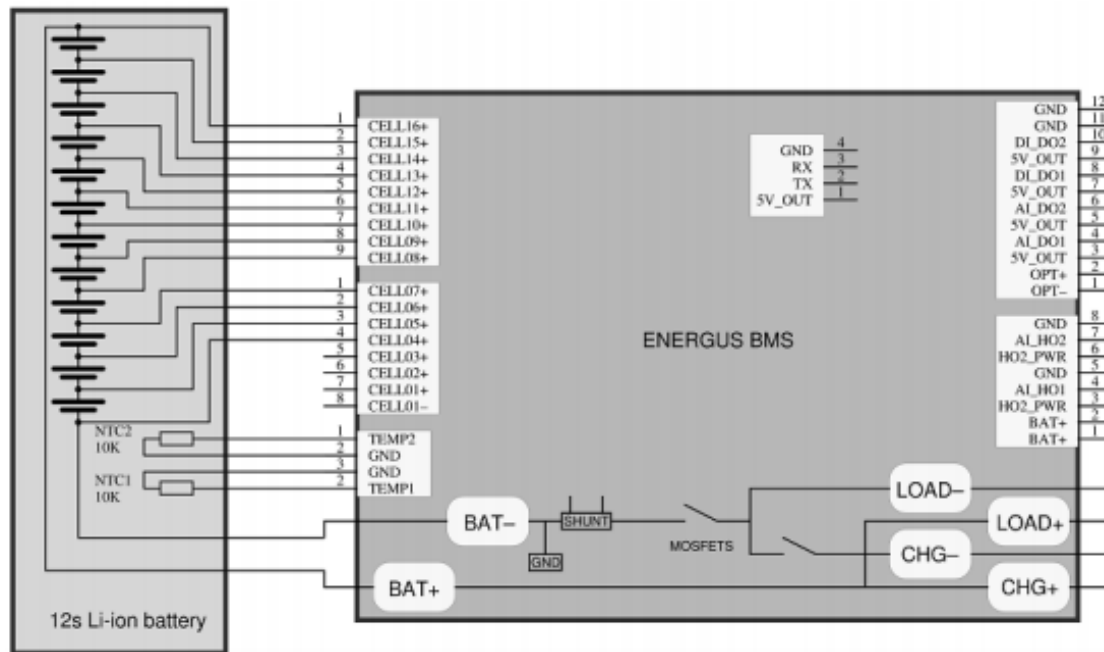


Figure 1. A typical connection diagram

Connection sequence:

1. Prepare cell connection: **connect the assembly(-ies) of balancing connector to cells first**. Double and triple-check voltages are in sequence on the connector(s). If there are less than 16 cells, lower contacts should be unused as shown in Figure 1.
2. Connect main power lines of the battery to B- and B+. Make sure connections are strong and contain no fuses or switches. BMS will boot up and beep several times.
3. **Connect balancing connector(s) to BMS ports CELL01-CELL16.**
4. **Connect USB cable to Windows PC and BMS, launch Energus Battery Insider configuration utility and set appropriate parameters:** voltage, temperature and current levels, number of cells in series. After that is done, BMS will be in Idle state.

**Note: Connection sequence is important.** Tiny BMS is supplied from BAT- and BAT+ and incorrect connection can lead to permanent damage of the board. **Main rule is to avoid balancing wire connection without BAT- and BAT+ being connected. When disconnecting from battery, disconnect balancing wires first, only then followed by BAT+ and BAT-.**

## **Battery Procedures**

We have a 16 cell fully active BMS with resistive balancing and three temperature sensors with charging controller and output current sensing. Our backup circuit is a single pack monitoring voltage with input and output control that runs a lower voltage and ensures that we never exceed the maximum voltage of 4.2v per cell. Charging is taken place under both circumstances by a constant current/ constant voltage power supply which charges at a constant and adjust current of 9.6 amps and a constant /adjustable voltage of 67.2 volts. The output control of the pack is governed by our central processing system (that the backup circuit) under the normal circumstances the battery monitor circuit and the central processing will have control over the output of the pack. The battery pack will not be enabled unless the central processing controller requests power from it.

When the main power is connected to the BMS the BMS must beep twice to ensure proper boot up proceed is finished. Once boot is finished the battery balancing leads may be connected to the BMS. The final connection is the UART form the BMS the PC. After the BMS has been powered you can also connect the wide cable (~18 pin functional side BMS block – biggest connector on board) to the BMS

### **BMS connection procedure:**

1. Connect temp sensors
2. Connect current sensor
3. Connect main power to BMS
4. Wait for BMS to beep twice

Note: the UART cannot be connected until the BMS has beeped twice

How to charge the batteries:

Both primary and secondary charging procedures are the same.

Charging voltage for the BMS is 67.8 volts. (This is because you loose 0.6v through the BMS.)

Note to charge the battery pack with the BMS connect the battery charger positive and negative leads directly to the BMS. To charge the batteries without the BMS connect the power supply directly to the respective positive and negative terminals of the battery pack.

### **How to adjust the battery power supplies:**

Remove the black “I ADJ” and “v ADJ” plugs and slowly adjust with a multi-meter connected to the output of the supply to verify the output voltage.

Backup charging voltage is 66 volts NOT TO BE EXCEEDED.

**How to disconnect the batteries:****BMS:**

Disconnect battery balancing leads. Disconnect UART cable. Disconnect function pinout.  
Disconnect main B+ and B- power lines.

**Hover Engines:**

Unplug Anderson connectors between ESCs and Hover Engines.

**COVER THE BATTERY TERMALS WITH ELECTRICAL TAPE****Emergency Procedure:**

**Brendan's Contact: 925-858-5879**