

# Engineer

## Battery Management System (BMS)

### Upgrade Instructions

**Engineer, Inc.**

# Enginer PHEV BMS Upgrade Instructions

## 1. Differences between Previous Versions and Upgraded Version

### Previous Version:

One BMS monitors only 8 battery cells;  
Equilibrium current is only 300MA;  
Energy consuming method rather than inter-charging to each other;  
With alarm noise at high or low voltage.

### Upgraded Version:

One single BMS manages 16 pairs of battery cells, i.e a total of 32 cells;  
Suspending charging once any single cell exceeds 3.8V;  
Suspending output once a single cell drops down to below 2.5V;  
System sleeps if any cell drops to below 2V;  
Advanced cells inter-charging (balancing) feature at 1.0-1.4 A current (coming soon).

### Warning:

- Please recharge promptly when system runs out of power;
- To avoid battery failure, please DO disconnect (pull off the sockets) BMS from batteries if system is not to be used for over one week.

## 2. Use of Monitor Screen Menu



Page 1: Displays input / output voltages and currents delivered by Enginer PHEV to stock (OEM) battery;

Page 2: Voltages in cells 1-4;

Page 3: Voltages in cells 5-8;

Page 4: Voltages in cells 9-12;

Page 5: Voltages in cells 13-16.

#### Buttons:

“ » ” Page down

“ « ” Page up

BMS in 30 seconds resumes Page 1 automatically.

#### LEDs:

“P” green LED: BMS power on

4 groups of lights correspond 4 groups of batteries:

**W1 P1** (cells 1-4);      **W2 P2** (cells 5-8);

**W3 P3** (cells 9-12);      **W4 P4** (cells 13-16);

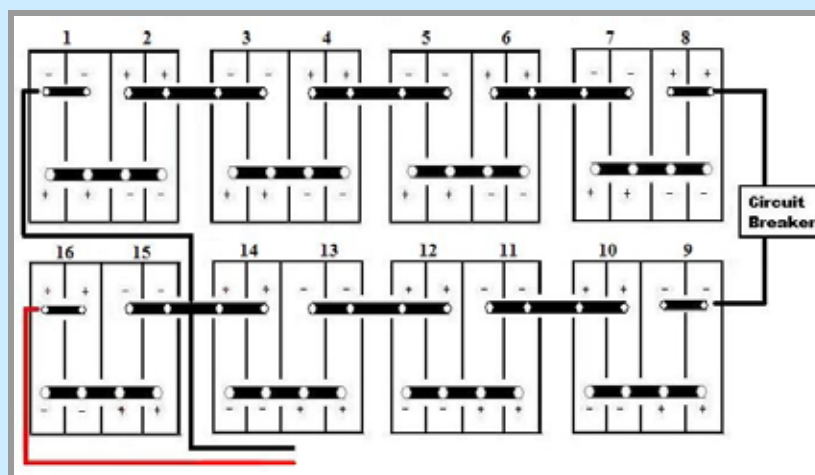
“W” red LED **flashing** alarms at least 1 of the 4 cells in the group at low voltage (<2.5V);

“W” red LED light: at least 1 of the 4 cells is over-charged (>3.8V).

### 3. Upgrade BMS Battery Connection and Wiring

#### (1) Cell connections

Two buddy cells in parallel inter-connected before multiple connection to another buddy cells. BMS displays voltages corresponding the numbers as shown in the following drawing:

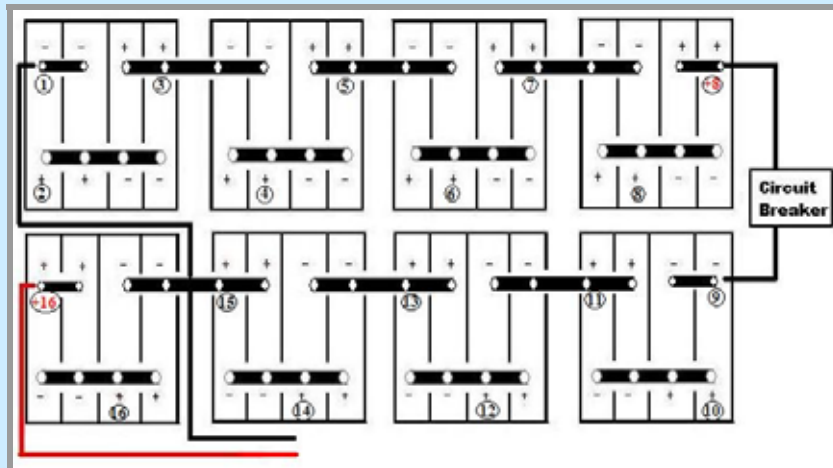


Connecting detecting wires

Each wire has been marked with number, please connect all wires properly to their right positions as shown below:

Port 1 is for lower bank cells (1-8)

Port 2 is for high bank cells (9-16)



## (2) BMS upgrade mounting and connections

### Mounting

#### a. PHEV without BMS mounting bracket:

Mount your new BMS on left top of Converter with 4 long screws which stick through and fix both BMS and Converter on chassis bottom. Flat rings are required in those screws between BMS and Converter for ventilation purpose.

#### b. PHEV with BMS mounting bracket on left side of the Charger

Fix the BMS on left top of Charger with 2 short screws on top of the Charger and the other 2 on the "Z" sharp bracket.

\* Connection / wiring between BMS and batteries remain the same as before.



Mounting without "Z" bracket



Mounting with "Z" bracket

Connecting batteries:

Plug battery voltage detecting wires 1-8 into a socket marked with “1” on BMS;  
Plug battery voltage detecting wires 9-16 into a socket marked with “2” on BMS.

**Warning: DO NOT plug wrongly between two sockets to avoid error.**

Connecting 5000W Converter: 8 pin cable, 2 combined wires, connectors. Insert BMS output into Anderson Plug on Converter input.

Connecting 3000W Converter: 8 pin cable, connectors. Insert BMS output into Anderson Plug on Converter input. There is no cut-off signal.

Connecting Charger: Insert BMS output into Charger output.

