MOVICOM ELECTRIC

BMS 2.1

Modular battery management system

BRIEF INFORMATION

Revision 1 (07-December-2020)

Contents

1 General information

The battery management system is a system that provides monitoring, balancing and protection a lithium-ion battery. The BMS measures voltage of each cell and the entire battery, monitors temperature and battery current. It protects battery from overcurrent, overcharge, deep discharge and overheating.

The system consists of a system controller BMS Main 2.1 and one or several measuring modules BMS Logic 2.0 (BMS Logic 12 or BMS Logic 18) that are connected to the battery cells. The BMS supports battery voltages up to **1000 volts** and currents of up to **1200 amps** (limited by the measurement range of the Hall-Effect current sensor).

2 Applications

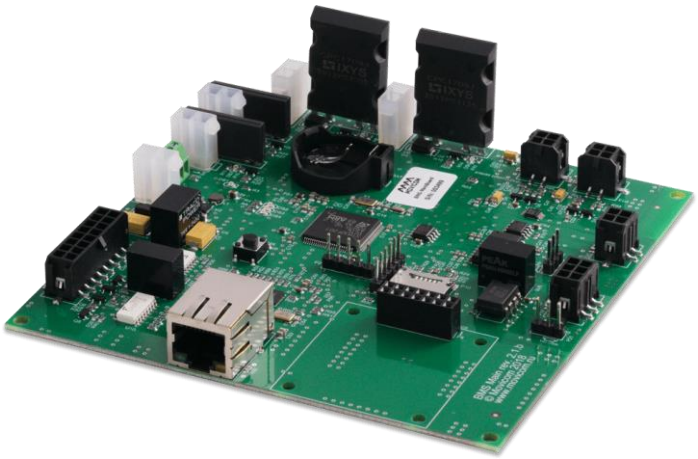
- Electric vehicles:
    - Electric cars and buses
    - Warehouse equipment
- Energy storages

3 System features

- Chemistry – LFP ($LiFePO_4$ and $LiFeYPO_4$), LCO ($LiCoO_2$), LMO ($LiMn_2O_4$), NMC ($LiNiMnCoO_2$), NCA ($LiNiCoAlO_2$), etc.
- Number of cells in series – up to 240 (BMS Logic 2.0 and BMS Logic 12) or 360 (BMS Logic 18)
- Voltage, volts – up to 1000
- Capacity – from ones to thousands A×h
- Fully configurable for different types of batteries (voltage levels, capacity, protections levels and delays).
- Determination of battery status:
  - State of charge (SOC)
  - Depth of discharge (DOD)
  - State of health (SOH)
  - Effective capacity
  - Cell resistance
  - Cycle counting
  - Energy counting (received, consumed and dissipated by balancing resistors)
- Cell monitoring:
  - Recording every cell voltage
  - Temperature control (up to 2 sensors on 12 cells for BMS Logic 2.0 and a sensor for each cell for BMS Logic 12 and BMS Logic 18)
- Current monitoring (bidirectional Hall-Effect sensor with supply voltage 5 volts)
- Battery protections:
  - Overcurrent
  - Undervoltage
  - Overvoltage
  - High temperature
  - Low temperature
  - Heater control
  - Cooler control
  - etc.
- Cell balancing (balancing current is 350 mA)
- Continuous logging on an SD card (full battery and BMS state are saved)
- Interfaces:
  - Ethernet (web interface to configure the system, Modbus TCP)
  - Wi-Fi (optional – web interface to configure the system, sending log files to a remote FTP server)
  - RS-485 (Modbus RTU)

- CAN (CANopen protocol to configure the system, it is also used for interaction with external equipment)

4 BMS Main 2.1 (system controller)

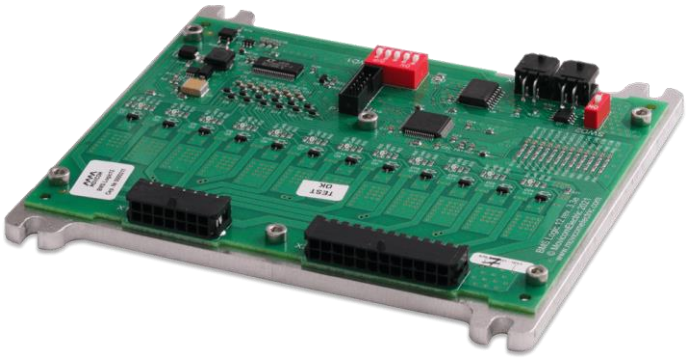


Parameter	Value
Supply voltage, V	9÷30
Current consumption @12 V, mA (max)	100
Number of relays	4
Number of discrete inputs (dry contact)	4
Number of discrete outputs (+5V)	4
Relay 1-2 output voltage, V (max)	55
Relay 1-2 output current, A (max)	2
Relay 3-4 output voltage, V (max)	55
Relay 3-4 output current, A (max)	8
Current sensor type	Hall-Effect sensor, bidirectional, supply voltage 5 V (LEM series HASS, HTFS)
CAN bus speed, kbps	125, 250 (default), 500, 1000
RS-485 baud rate, bps	600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200
Ethernet speed, Mbps	10/100
RS-485 for communication with BMS Logic baud rate, bps	115200
Maximum number of the BMS Logic boards	20
Dimensions (length × width × height), mm	120 × 120 × 32
Weight, g	100±5
Operating conditions	
Operating temperature range, °C	-40÷75
The degree of protection from external influences	IP00

5 BMS Logic 2.0 (measuring module)

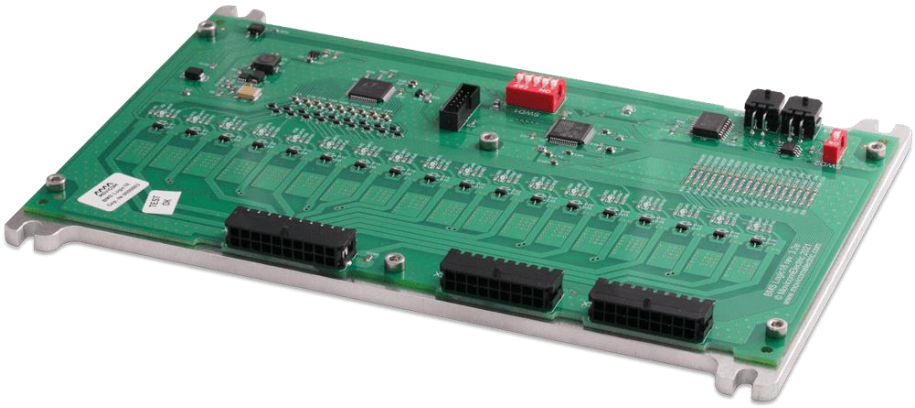
Parameter	Value
Supply voltage, V	5.0±0.5
Current consumption @5 V, mA (max)	40
Balancing current @4.2 volts on a cell, mA (average)	350
Cell voltage measurement error, V	0.012
Cell temperature measurement error, °C	2
Cell stack voltage	10÷60
Number of cells	4÷12
RS-485 baud rate, bps	115200
Dimensions (length × width × height), mm	125 × 84 × 25
Weight, g	180±5
Operating conditions	
Operating temperature range, °C	-40÷75
The degree of protection from external influences	IP00

6 BMS Logic 12 (measuring module)



Parameter	Value
Supply voltage, V	5.0±0.5
Current consumption @5 V, mA (typical)	4
Power consumption @Cell stack, mW (max)	175
Balancing current @4.2 volts on a cell, mA (average)	350
Cell voltage measurement error, V	0.003
Cell temperature measurement error, °C	2
Cell stack voltage, V	10÷80
Number of cells	4÷12
Dimensions (length × width × height), mm	139 × 126 × 16
Weight, g	166±5
Operating conditions	
Operating temperature range, °C	-40÷75
Degree of protection from external influences	IP00

7 BMS Logic 18 (measuring module)



Parameter	Value
Supply voltage, V	5.0±0.5
Current consumption @5 V, mA (typical)	4
Power consumption @Cell stack, mW (max)	175
Balancing current @4.2 volts on a cell, mA (average)	350
Cell voltage measurement error, V	0.004
Cell temperature measurement error, °C	2
Cell stack voltage, V	10÷80
Number of cells	6÷18
Dimensions (length × width × height), mm	214 × 140 × 16
Weight, g	370±5
Operating conditions	
Operating temperature range, °C	-40÷75
Degree of protection from external influences	IP00

8 Contacts

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9 Revision history

Rev. number	Rev. date	Changes
1	07–December–2021	First revision