

Orion BMS

Lithium Ion Battery Management System



Main Features

- Monitors every cell voltage
- Field programmable and upgradeable
- Intelligent cell balancing (efficient passive balancing)
- Enforces min. and max. cell voltages
- Enforces maximum current limits
- Enforces temperature limits
- Professional and robust design
- Monitors state-of-charge
- Retains data about battery history
- Integration with 3rd party smartphone apps (Torque, EngineLink)

Battery Compatibility

- Compatible with almost all lithium-ion cells
- One-click setup for many common battery types
- Supports 4-180 cells in series per BMS

Calculations

- State of Health
- Open circuit cell voltage
- Charge current limit
- Discharge current limit
- Internal resistance (for each individual cell as well as the total pack)

Centralized Design

- No cell tap boards or external circuitry
- Fast cell voltage polling (every 30 mS typical)
- High immunity to EMI and other noise
- High accuracy cell voltage measurement

2 Programmable CANBUS Interfaces

- CAN2.0B (11-bit and 29-bit IDs supported)
- Independently operate at different baud rates
- Fully customizable message formatting
- Field upgradable firmware and settings using CAN interface
- One-click setup for many common chargers and inverters
- OBD2 protocol compatible (supports many scan tools)
- Can be used with CANOpen and J1939 Applications

Input / Output

- Easy interfacing with chargers and loads
- On/off outputs for controlling charge and discharge
- 0 – 5V analog outputs for gradual current reduction (improves usable range of battery)
- Thermal management controls for battery cooling / heating

Diagnostic Features

- Diagnostic trouble codes quickly identify and diagnose battery problems
- Freeze frame data records exact conditions when a fault occurred.
- Supports OBD2 automotive protocol for storage of diagnostic trouble codes and polling of live data

Data Logging

- Unit tracks total number of battery cycles
- Records number and duration of over-temperature and over-current events
- All BMS parameters can be logged using PC utility software
- Optional data logging display can record any parameters to a memory card

Other features

- Isolation fault detection
- Multiple BMS units may be used in series
- Automotive grade locking connectors
- Temperature compensation for improved monitoring in different temperatures

Common Applications

- Electric Vehicles (cars, trucks, busses, boats, heavy equipment, racing, etc)
- Hybrid & Plug-In Hybrid Vehicles
- Solar and wind energy storage
- UPS and peak shaving applications
- Research

The Orion BMS is a product of Ewert Energy Systems, Inc.

Ewert Energy Systems is a research and development company focused on developing solutions for plug-in hybrid and electric vehicles and other energy storage applications.



Cell Voltage Monitoring Specs

- Cell voltage resolution of about 1.5mV
- Maximum individual cell voltage rating: 0.5v to 5v per cell tap.
- Cell voltage measurement total error <0.25% across full temperature range.
- Total pack voltages from 13v up to 850v (max.)
- Supports from 4 to 180 cells per BMS (more if units in series.)

Reliability & EMI Immunity (Rev E)

- Operates through the highest class passenger vehicle load dump ISO 7637 Class IV (87V, 400mS, 0.5 ohm source.)
- Operates through ISO 7637 “cold crank” brownouts down to 5v on 12v supply rail and can operate > 100mS with no power (with initial voltage of 12v.)
- Meets EN 50498: 2010 EMC Aftermarket Vehicle Directive
- Meets 2004/104/EC EMC Road Vehicle Directive last revised as 2009/19/EC

Product Dimensions

- Standard Enclosure: 9.45 in (W) x 6.85 in (L) x 3.23 in (H)
- Extended Enclosure: 15.98 in (W) x 6.85 (L) x 3.23 in (H)
- Weight (Standard Enclosure): 5.35 lbs
- Weight (Extended Enclosure): 8.85 lbs

Isolation

- Cell taps isolated from 12v supply, chassis and I/O
- 2.5kV isolation between each connector of cell taps
- Isolation allows for use of in-pack safety disconnects and fuses
- High voltage isolation fault detection circuit to monitor the breakdown of wire insulation

I/O Interfaces

- 2 Digital signal outputs for enabling charge and discharge.
- 1 Digital signal output to control a battery charger
- 2 Digital programmable CANBUS (CAN2.0B) interfaces.
- 4 Analog 0-5v outputs that represent the following signals: Charge Current Limit (CCL), Discharge Current Limit
- 1 PWM fan output and fan speed feedback monitor (external switch and relay required.)
- 4 thermistor inputs (Can support up to 800 thermistors through external thermistor expansion modules (expansion modules sold separately)
- 1 Dual range current sensor input (measures pack current)

Power Supply

- 3 redundant 12V DC power supplies for reliability
- BMS retains data without power (rev D and newer)
- Low power sleep mode

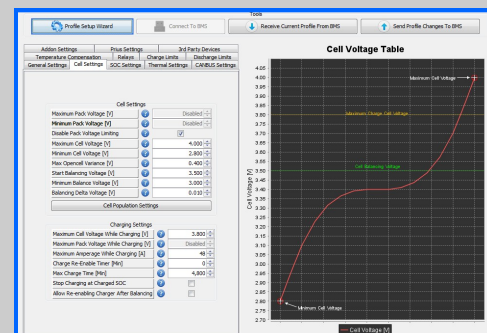
Specification Item	Min	Typ	Max	Units
Supply Voltage	8		16	Vdc
Supply Current—Active		250		mA
Supply Current—Sleep (Rev. D & E)				uA
Operating Temperature	-40		80	C
Sampling Rate for Current Sensor		8		mS
Sampling Rate for Cell Voltages		30	50	mS
Isolation Between Cell Taps and Chassis / 12v Supply	2.5			kVrms
Isolation Between Cells 36-37, 72-73, 108-109, & 144-145	2.5			kVrms
Digital Output Voltage (Open Drain)			30	V
Digital Output Sink Current (Rev. D & newer)			175	mA
Cell Voltage Measurement Range	0.5		5	V
Cell Voltage Measurement Error (over 1-5v range)			0.25	%
Cell Balancing Current			200	mA
Cell Current (Operating)		5		mA
Cell Current (Sleep)				
Thermistor Accuracy				C
Cell Voltage Reporting Resolution		1.5		mV

Optional Specifications

CAN bus speed	125, 250, 500, or 1000 Kbps
Current Sensor Values	+/- 200A, 500A, 750A, 1000A Available



Screenshot of Torque smartphone display



Screenshot of BMS utility