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.

**What’s New?**

**Key Features**
- Significantly improved cell voltage measurement accuracy & resolution (0.1mV resolution)
- Lighter weight, smaller, and more optimized mechanical design
- Compatible with both 12v and 24v power supplies
- Ability to directly drive contactors on select outputs (limitations apply)
- Integrated J1772 & CHAdeMO support
- Significant algorithm improvements
- Expanded diagnostic capabilities
- Significantly improved multi-unit operation with remote modules
- Additional inputs and outputs
- 8 thermistors on base unit

**Cell Voltage Measurement Improvements**
- Significantly improved voltage measurement resolution (0.1mV) and accuracy (+/-5mV)
- Parasitic power draw from the cells has been reduced by nearly 10x (0.5mA vs. 5.0mA)
- Cell tap wire length does not significantly affect measurement accuracy

**Power Supply**
- Now accepts 12v and 24v input power (9v-30v actual)
- More efficient power supply
- Meets 12v passenger vehicle and 24v heavy-duty truck standards for transient protection (SAE J1113 & J1455)
- Power supply is load-dump protected up to 178V (SAE J1113 & ISO 7637-2 Class IV)

**Mechanical Improvements**
- Connectors moved to adjacent sides for easier mounting in tight spaces
- Smaller size available for 72 cell sizes and lower
- Significantly reduced weight
  - 40% reduction for a 180 cell unit
  - 40% reduction for a 108 cell unit
  - 50% reduction for 72 cell & lower unit
- Removable heat sink allows for cold plate compatibility (minimum heatsinking requirements apply)
- Larger mounting holes with more convenient slotted shape for easier mounting
- Cell tap connectors now gold plated for higher long term reliability (only gold plated harnesses may be used with gold connectors; available as special order with tinned connectors for backwards compatibility)
- New Status LED on BMS unit indicates power, normal status, or fault status

**Integrated J1772 & CHAdeMO Support**
- BMS directly interfaces with J1772 charging inlets (control pilot & proximity detect)
- Provisions for charge limiting based on J1772 current limits (support varies by charger)
- Status of J1772 circuit including AC current limit available via CANBUS
- Ability to receive AC input voltage for current limiting from supported chargers
- Integrated CHAdeMO offboard charging support with easy one click setup

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Input / Output

- 8 thermistor inputs on the base unit with programmable B-values (additional thermistors can be added by using thermistor expansion modules)
- 2 new multi-purpose outputs added for a total of 5 multi-purpose outputs (fan PWM and fan output can now be used as multipurpose outputs)
- 2 additional multi-purpose input pins for a total of 3 multi-purpose inputs
- Current sensor accuracy improved
- Shorter time from power up to activation of relay outputs
- Total pack voltage sensor removed (pack voltage calculated from cell voltages)
- Amps analog voltage output removed (CCL, DCL, and SOC remain)
- Open drain outputs and multi-purpose inputs now compatible with 24v systems (30v max)
- Charge enable, discharge enable, charger safety, and multi-purpose enable outputs can directly drive certain contactors with economizers (see wiring manual for compatibility details and maximum total amperage limitations)
- Charge enable, discharge enable, and charger safety outputs can now turn back on after an over-current event

Improved Interfacing with Thermistor Expansion Modules

- Thermistor Expansion Modules can now be programmed directly through the BMS utility
- Additional thermistor expansion module information displayed directly on the live text data screen
- Thermistor expansion module data and settings can be changed regardless of which CANBUS interface they are connected on (may be on a different interface than is connected to the PC)
- Streamlined setup procedure

Significantly Improved Series Unit Operation for Semi-Distributed Systems (Remote Modules)

- Supports up to 2 remote modules (in addition to the main unit)
- Only one profile and one current sensor used. No programming of remote units
- All cell and fault codes are displayed on the primary unit
- Remote modules support up to 8 thermistors each
- Support for up to a total of 324 cells in series (Note: max voltage limitations apply)
- Remote modules can be used to monitors cells twice for redundancy or for higher balancing currents
- Lower cost for remote modules

CANBUS Improvements

- New CAN transceivers with better transient protection
- Increased to 15 programmable CANBUS messages (previously 10)
- Increased to 8 programmable custom flags (previously 4)
- Expanded J1939 compatibility
- Battery cell broadcast enhancements (extended IDs and programmable intervals)
- New data fields include J1772 AC current limit, J1772 output power, J1772 AC voltage (with supported charger), J1772 plug status, observed pack capacity, and CANBUS1 and CANBUS2 fault status.
Improved Fault Detection & Reporting

- “Pack Too Hot” fault code
- New faults for cells over & under voltage for 10 continuous seconds
- Internal self-test to check balancing circuits each power up
- Detection for backwards current sensor or current sensor channels
- Additional monitoring and fault codes for internal hardware faults
- Up to 3 sub-codes for each freeze frame, giving more data in the event of a fault
- Improved open wire detection capabilities
- Utility translates most sub-code data to more human readable form.
- Weak cell faults now indicate out of balance cells vs. low capacity cells, and if the fault is due to high resistance or mismatched cells.
- Weak cell fault thresholds are now programmable via a user specified table for better accuracy at low temperatures.
- Fault freeze frame data now persists across power loss and clearing the fault codes.
- Maximum amount of freeze frame data that the unit can store has been increased.

Improved battery management algorithms

- Tracks capacity degradation and adjusts state of charge accordingly (compensated and uncompensated values available)
- Improved state of charge calculation – more options and ability to specify speed at which SOC corrections happen
- Improved open circuit voltage calculation method for certain cell chemistries
- More refined control over charge and discharge current temperature limits, allowing non-linear rules (user defined table vs. calculated values)
- Over-current limiting now allows for a constant offset rather than a simple percentage, which may become very small at low limits

Improved Isolation Fault detection

- Isolation measurements taken from cell tap 1 with no separate wire or connector required
- Circuit can be fully disabled through the utility to prevent interference with other external fault detection systems (previous versions required hardware modifications for this)
- Improved algorithm to prevent false positives from rapid changes in current.

Expanded Data Logging Diagnostics

- Event logging tracks when and why outputs turn on/off for quick diagnostics (includesSOC corrections, fault codes being set or cleared, J1772 status, and more)
- Lifetime thermal histogram
- Lifetime charge / discharge current histogram
- Lifetime state of charge histogram

Other Improvements

- Improved password protection to allow for more complex passwords with characters
- Firmware can now be updated via the CAN1 or CAN2 interfaces (previously only CAN1)
- Improved memory integrity verification
- Dozens of other minor improvements and tweaks to optimize performance and reliability