



# 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

## 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

## Cell Voltage Measurement Improvements

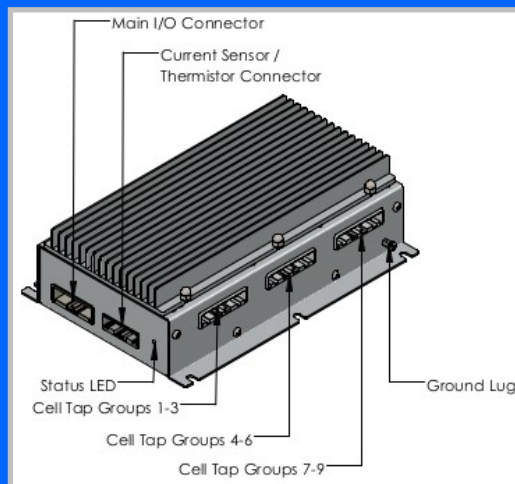
- Significantly improved voltage measurement resolution (0.1mV) and accuracy (+/-5mV)
- Parasitic power draw from the cells has been reduced by nearly 10x (0.5mA vs. 5.0mA)
- Cell tap wire length does not significantly affect measurement accuracy

## 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)

## 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



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.



## 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

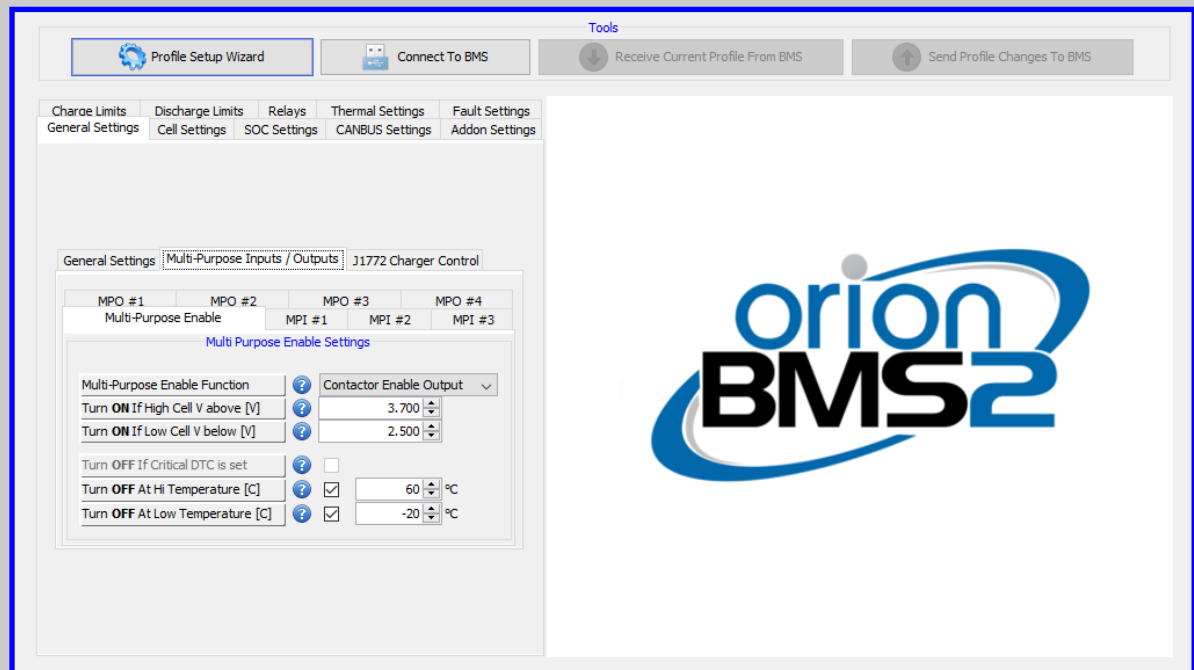
- Thermistor Expansion Modules can now be programmed directly through the BMS utility
- Additional thermistor expansion module information displayed directly on the live text data screen
- Thermistor expansion module data and settings can be changed regardless of which CANBUS interface they are connected 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 monitor 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.

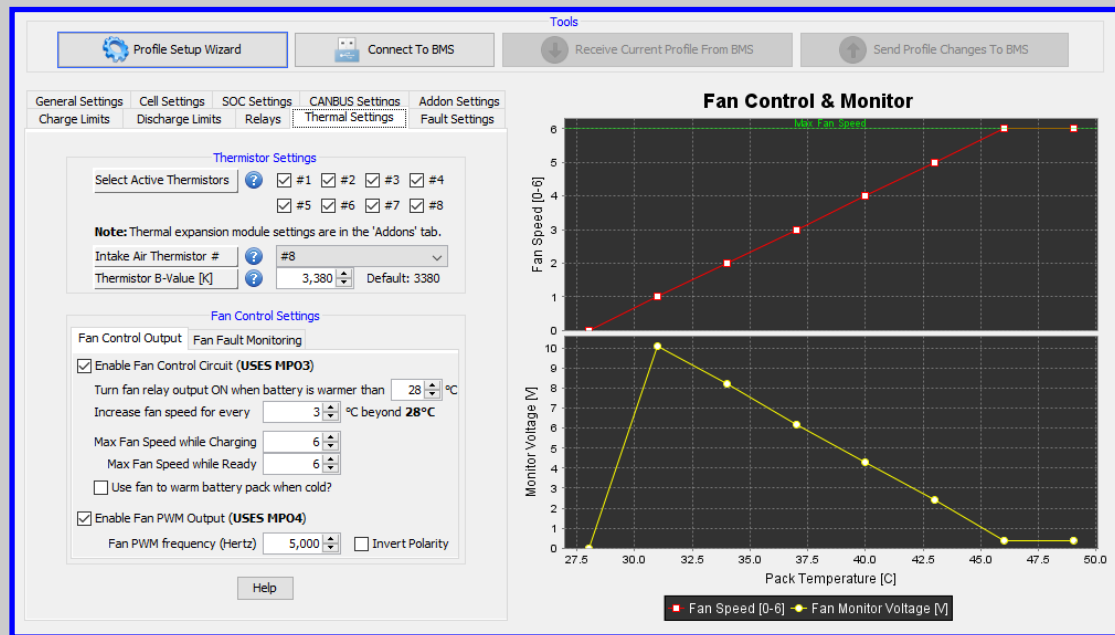


## Improved Fault Detection & Reporting

- “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 (includes SOC 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