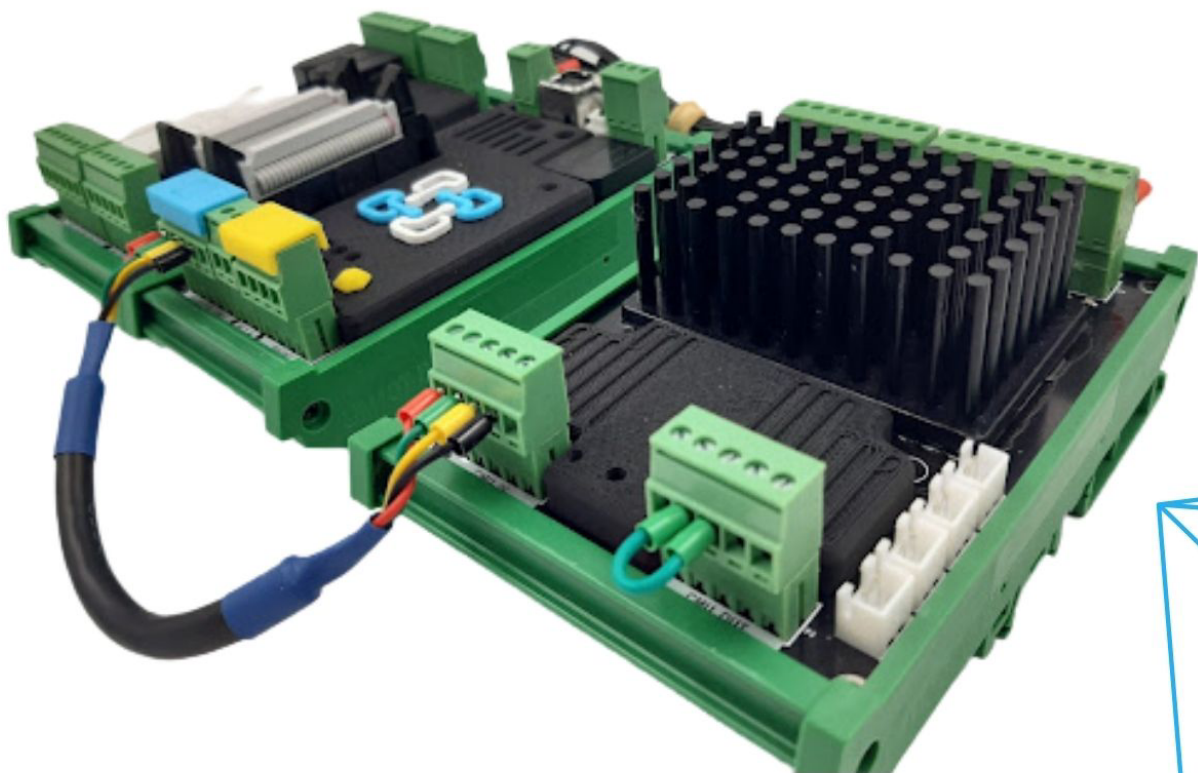# Batrium
BATTERIES MADE SMARTER

PRODUCT GUIDE

Overview

Battery Management systems (BMS) are a vital component of a battery pack. It monitors the individual cell voltages and temperatures to keep them within safe operating conditions and trigger, if necessary, circuit breakers, fans, contactors, or other components that may be connected based on that data.

The Batrium BMS is made up of several basic components. The following are the main components:

1. **A supervisor - (WatchMonCORE)** – This is the brain of the system. It is configurable to your requirements and can monitor between 1 and 250 cells.
2. **Cell Monitors (CellMate-K9, LongMons, BlockMons, LeafMons, MultiMons)** – Monitor the voltage and temperature and perform balancing to even up the cells within the battery pack for a better performing battery.
3. **SOC% Sensor (ShuntMon2)** – Due to the fairly flat voltage curve of most lithium batteries, voltage is not a good indicator of the state of charge. The ShuntMon2 measures voltage, current, and temperature, and by measuring the Ah going in and out of the battery bank can use this to determine State of Charge (SOC%)
4. **Expansion Board (Expansion3)** – An onboard relay is included on the WatchMon CORE intended for the circuit breaker if wanting to trigger extra items such as contactors, heaters, fans, alarms, etc. The expansion board provides extra options that can be used as triggers.

Safety Warning – Disclaimer

Batrium BMS products are produced safe and robust which performs as described.
However, since we have no control over the integration of our products into a battery system, we can assume no responsibility for the final safety or functionality of the completed installation.

It is up to the end-user to determine the suitability of the products for the purpose and the end-user assumes all risks associated. Products should only be installed by suitably qualified and experienced persons. Incorrect installation can be hazardous. The product should always be used safely and lawfully according to any local requirements.

Using the product other than what it is intended for, especially if that compromises its core functions, including modification of components, is considered improper use and will void any warranty.

Hardware

WatchMonCORE Supervisor
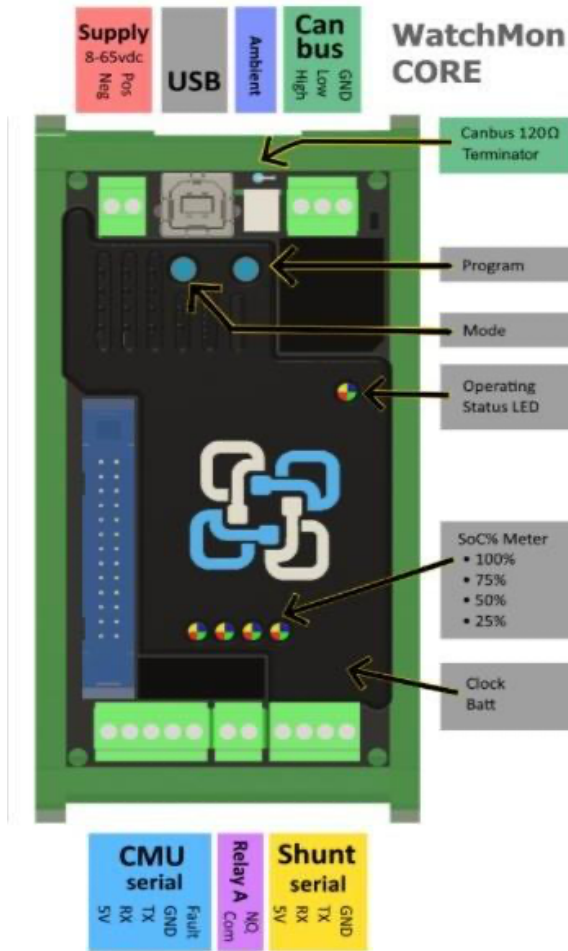
- **BMS** to suit LiFePO4, Lithium-Ion or custom chemistry.
- User configurable parameters and control logic
- Configurable 30vdc 5A relay (**i.e. remote circuit breaker trip, contactor or fan**)
- Additional inputs / outputs via Expansion Board purchased separately.
- Compatible with all Expansion Board (**Series 1, 2, or 3**)
- Clock with backup battery data logging of key metrics for 10 years
- Firmware upgrades via USB
- 4 stage display of State of Charge (**SoC%**)
- External ambient temperature sensor
- Easy to use pluggable screw-terminal connectors
- With distributed cell monitors capable of **28 Ah / day** balancing adjustment for each cell
- Link to ShuntMon with **500A** or **1000A** power rating

CellMate-K9
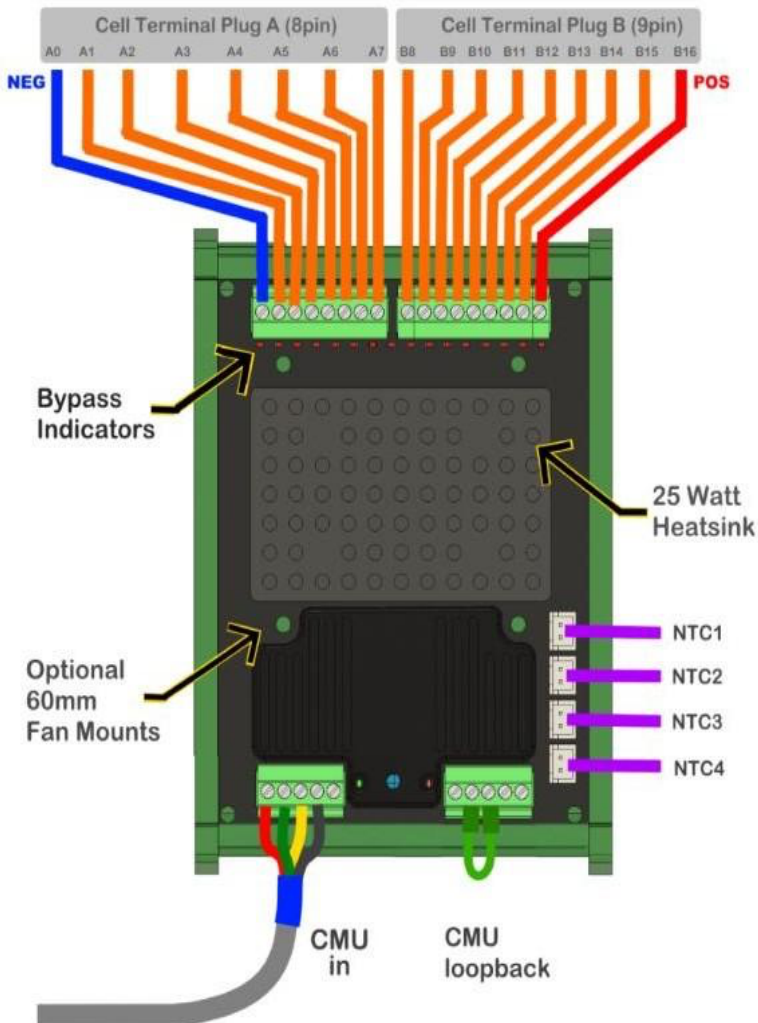
- 3s to 16s cell monitoring
- Two or more CellMate-K9 can be daisy chained to create a higher voltage battery.
- Multistring is possible using multiple CellMate-K9, e.g. one per CellMate- K9 per 12V, 24V or 48V bank

- Requires with WatchMon CORE supervisor, not compatible with older WatchMon supervisors
- Separating cell monitoring from the supervisor for a more robust solution.
- Able to have Fan mounted to enhance balancing (60mm Fan)
- Pluggable connectors for easy wiring.
- Enable second life use of existing balancing connectors in OEM packs like Tesla, Nissan Leaf, Chevy Volt, etc. that use "shared" wires between each cell in series (recommended to attach 3A fuse inline as close to battery as possible to protect cabling).
- Cell monitoring from 0.50V to 5.50v with 0.001v resolution
- Configurable to suit all Lithium chemistries
- User-configurable presets and controls
- 4 external temperature sensors
- LEDs showing operating status and communication
- 25 Watt Heatsink for greater balancing.

IsoMon3 + Individual monitors
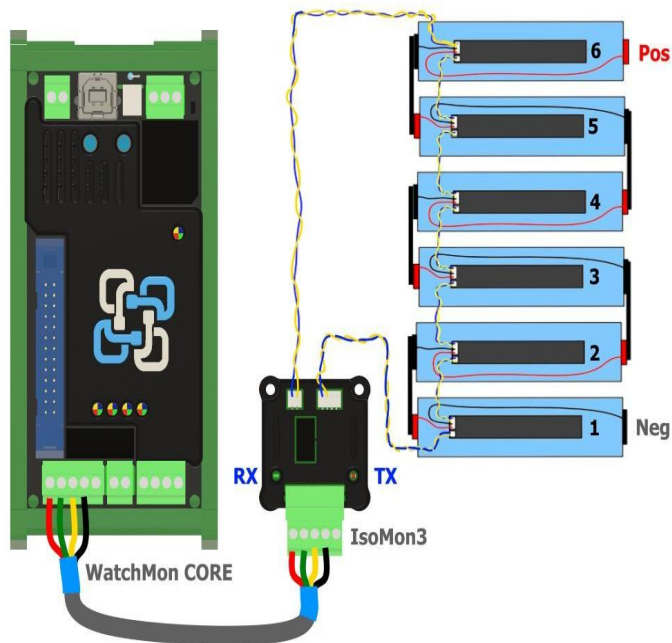
This includes LongMons (pictured), BlockMons or LeafMons:

- Battery range 2.2V to 5.4V.
- Bypass current 0A to 2A (typically 1A).
- Over-temperature protection.
- Over-voltage protection up to ±20V.
- Noise immune opto-isolated.
- Cell temperature and bypass load temperature measurements.
- USB monitoring of live individual cell parameters and remote cell diagnostics.

- Sealed in black thermally conductive epoxy (robust and safe).
- Red and green LEDs for diagnostics and status.
- All parameters fully remotely programmable and software is remote upgradeable.
- Not suitable for second life use of existing balancing connectors in OEM packs like Tesla, Nissan Leaf, Chevy Volt, etc. that use "shared" wires between each cell in series
- Powered from cell.
- Low power use 4mA typically when operating
- Under voltage protection by turning off below 2.1

ShuntMon2
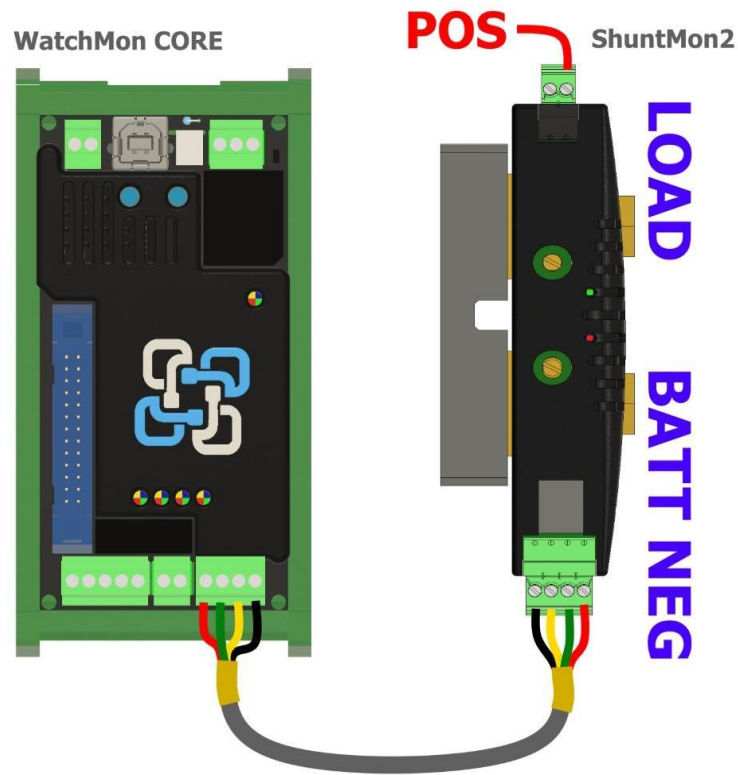
- Current ± 500 A peak (400 A continuous) 500A model
- Current ± 1000 A peak (800 A continuous) 1000A model
- Maximum Voltage = 650v DC
- Turnkey solution for use in the field
- Typically achieves ±1.0 % accuracy of current measurement
- Resolves currents from 3 mA to 500A
- Low power consumption
- Built-in calibration for current and voltage measurements
- Built in isolation for power and serial communication

Expansion3
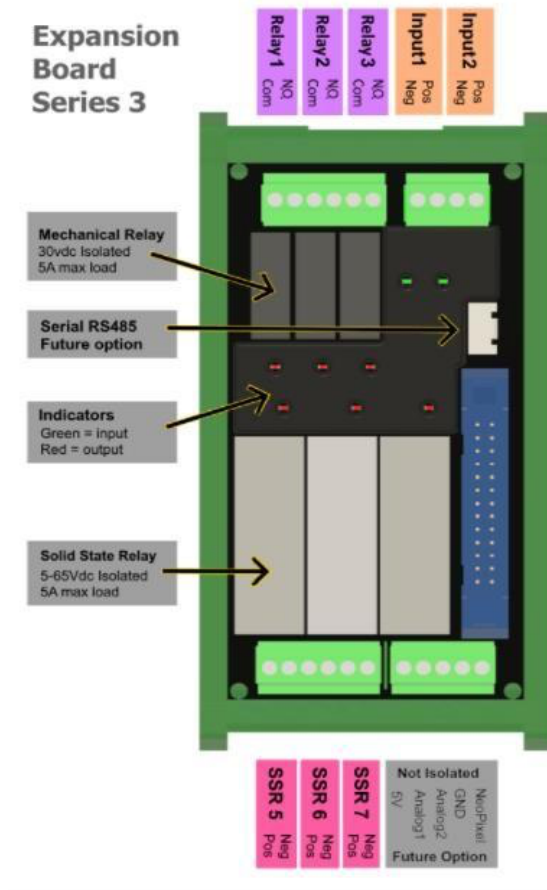
- 3 x Mechanical 30Vdc 5A relay outputs
- 3 x Solid state relay SSR 65vdc 5A isolated modules outputs
- 2 x Isolated inputs 5-65vdc sensor channel
- 2 x ADC 0-5vdc (**future development option**)
- 1 x RS485 Serial port (**future development option**)
- 1 x External Addressable LED (**future development option**)
- Compatible with all previous WatchMon supervisor