

Product Overview

--- Hawkeye Innovations LLC ---

General Overview: The SCM is a centralized control module designed to save countless hours of time and effort while providing a clean factory look. It controls almost all aspects of your electric vehicle's (EV) 12V system, and the way it interfaces with various high voltage (HV) components. The SCM is a great solution that simplifies the overall wiring of the vehicle.

Compatibility: The SCM is designed to be used with the popular EV conversion setup employing Tesla Model S/X modules (liquid cooled using a Tesla coolant pump), HyPer 9 AC drive system by NetGain Motors, Orion BMS 2 by Ewert Energy Systems, and battery charger and DC/DC converter by ElCon. All of these products are systems we sell and are available. For more information on compatibility and options, please contact us.

Base model features:

- DC/DC converter control
- 12V battery watchdog
- Coolant pump control
- Cooling fan control

Optional add-on features:

- Power brake control
- Power steering control
- Electric air conditioning control
- Electric heater control
- Display module
- Dash Gauge module
- Battery preheat function

Feature Details

DC/DC Converter control – Fully compatible with ElCon DC/DC converters we sell. The SCM powers-up the DC/DC converter in two different states. (1) Ignition is on (driving mode). (2) Ignition is off and the vehicle is in charging mode. This is so the 12V battery will stay charged under the ‘charging’ state loads of the coolant pump and coolant fan.

12V Battery Watchdog – All EV conversions have parasitic draws on the 12V system that, unaddressed, will discharge the 12V battery. At the very least, it can leave your BMS with no power, preventing the car from being started. Over time, repeated over-discharge abuses will eventually kill the battery (batticide!). The SCM’s Watchdog circuit monitors the state of charge (SOC) of the 12V battery, and at 12.7V automatically powers-up the EV’s DC/DC converter to recharge the 12V battery. This system is superior to leaving your DC/DC converter on to constantly charge your 12V battery, which harms the battery and is now a significant parasitic draw on the HV system.

Coolant pump control – The coolant pump is activated during ignition-on driving mode, but also needs to be on during charging without backfeeding to the ignition system, so the SCM controls the coolant pump in two ways. (1) In the ‘ignition on’ state (driving mode), it sends power to the coolant pump for heating/cooling the HV Tesla modules via feedback from the Orion BMS thermal management system. (2) The SCM also sends power to the coolant pump in the ‘ignition off’ state (charging mode), and does so without backfeeding to the ignition-controlled circuits. This will also turn the coolant pump on during battery preheat if that option is installed on the SCM.

Cooling fan control - As with the coolant pump, the cooling fan will automatically turn on and off via the set temperature in the Orion BMS settings, in both driving and charging modes.

Optional: Power brake control – Controls an external relay (customer supplied) used to power-on most electric brake vacuum kits.

Optional: Power steering control – A built in heavy duty 100A relay switches on the power steering pump. A second +12V ‘turn-on’ trigger signal is provided. This system is compatible with the very popular and reliable Volvo electric power steering pumps easily sourced from wrecking yards and/or eBay at affordable prices. We have images of the correct pump, please

contact us if you have any questions about finding the correct volvo electric power steering pump.

Optional: Electric air conditioning control (EACC) – This optional feature adds all control needed for the electric HV Air Conditioning Compressors we sell, but will work with other units of similar design as well. Our compressors are rated at 15,700 BTU/hr at full speed, and are much more affordable than other compressors of similar output. Other setups are a two piece affair with a compressor and controller. This compact unit has the controller built in as a one piece design, saving space and significantly simplifying wiring. They are dependable, and have no problem with keeping up with the tough Texas heat experienced here at Hawkeye Innovations :-). There is a user input that facilitates turning-on the A/C by simply switching the ‘A/C user input’ wire to -12V ground. At start up, this control feature initiates precharge, then triggers the SCM’s internal contactor switching the high voltage to power-up the compressor.

When ordering the SCM with the EACC option, you can choose the compressor rpm value (amount of cooling). If adjustable compressor speed is desired, an add-on accessory rpm control is available. This accommodates running the compressor at higher speeds in summer, and lower to medium speeds in fall and spring.

Optional: Electric heater control (EHC) - EV conversions can either use a solid state ceramic heater core or a warmed-liquid setup. Both have advantages and disadvantages. Most older donor vehicle’s access to the heater core is pretty simple and straightforward. In this situation, it is easy to replace the liquid core with a ceramic element. This provides instant-on cabin heat with no hoses, pumps, or reservoirs required. Newer vehicles are constructed in a unique way - a heater core is mounted in a raw chassis, then the entire car is built around that heater core :-). Seriously, the amount of effort required to access the heater core in newer vehicles is substantial, oftentimes requiring removal of the entire dash assembly! In this instance, retaining the liquid heater core and supplying a heated liquid source is a better solution.

The SCM’s EHC option adds a heavy duty HV contactor to control either a ceramic element, or a warmed liquid heater setup. The heater type must be specified at checkout.

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We offer a 3kW fluid heater/reservoir kit, consisting of a reservoir with integrated float sensor, temperature regulation sensor, and attached fluid pump. The heater can be controlled via a user input on the SCM by switching the designated wire to -12V ground.

Optional: Display module – This option displays a vivid battery graphic ‘fuel gauge’ and runs off of the Orion BMS State of Charge (SOC) calculation. In addition to the empty-full battery graphic, the SOC is listed as a percentage as well.

There is also a red check engine light when the Orion BMS has a critical error present, and a separate yellow check engine light if the HyPer 9 controller has a fault present. Please note that the HyPer 9 check engine light is only compatible with the high voltage model HyPer 9 (X144 controller).

Optional: Dash Gauge module – This four segmented LED strip shows the SOC as calculated in the Orion BMS. All four LEDs will be green at greater than 75% SOC, three yellow LEDs at less than 75%, two orange LEDs at less than 50% SOC, one red LED at 25% SOC. This feature can be disabled via a user input switched to -12V ground. This is useful if the vehicle is dormant for a period of time.

Optional: Battery preheat function – This feature utilizes our battery coolant reservoir with the addition of a built-in 1kW heating element to warm the liquid (when needed). Tesla modules must be at 41°F or warmer when charging. Additionally, in colder weather, warmed batteries will retain their full capacity.

If battery temperature is below the safe threshold for charging, this system automatically powers-up the preheater while prohibiting the vehicle from charging. When the threshold temperature is reached, the SCM will allow the charger to power-up. This system will also preheat the batteries when ignition is on (discharging). These temperatures are programmed in the settings of the Orion BMS. A user input (when switched to -12V ground) can disable this feature if necessary when servicing the vehicle.

“Common problems” the SCM solves

- *Effortless and seamless integration of aftermarket accessories (i.e. Air conditioning, heater, display, and more).*
- The coolant pump must be on when the car powers up (ignition on), as it cools down the components during discharge. The challenge arises when the vehicle needs the coolant pump to also be on during charging as well. If the pump is wired to your ignition system, that will not function correctly. When you try to charge the car, it will back-feed into your ignition system and turn the car on – which is a problem. Typically, this is resolved by adding at least two separate relays and some tricky logic – which increases the complexity of your conversion. Since the SCM maintains control over the coolant pump in the vehicle, this common problem is easily solved.
- The 12V Battery Watchdog feature of the SCM will protect the 12V battery from the parasitic draws of the car or EV components like the BMS, which tends to be a common problem in some old and new conversions.
- Cold weather conditions present a challenge in a conversion, but the optional battery preheat function and preheating reservoir are a great solution. The preheating tank has integrated sensors to self regulate. It is able to self regulate by sensing the coolant temperature in the tank, and regulating the built in heating element while keeping the coolant pump working to provide efficient preheating of the batteries. To install, connect the sensor harness and wire up the two preheater output wires to the tank. Set your settings in the Orion BMS to trigger, and the SCM will take care of the rest.
- With the Orion BMS, it only sends out CAN bus data when the ignition is on, or when the car is charging. If you are using the Orion Connect WiFi module, this could potentially be an issue. Here at Hawkeye Innovations, we enjoy being able to check up on the battery pack any time of day, and our customers like this feature too. The solution to this is to keep the Orion BMS in the “awake” state all of the time, which keeps CAN bus data flowing to the WiFi module. Unfortunately, this also enables the Orion fan output, which on a hot day, may leave your cooling fan running continuously even though the car is off. The SCM also has an integrated cooling fan control that will provide additional checks to see if the BMS is requesting the fan, but will only allow it if the car is actually on or charging, fixing this common problem.