



## CHAdEMO Integration With Orion BMS 2

CHAdEMO is a popular DC fast charging protocol used extensively throughout the world, providing up to 62.5 kW of DC output power (500vDC, 125A maximum). It is ideal for many automotive and mobile applications due to the simplistic design of the protocol and minimal integration requirements.

The CHAdEMO protocol interfaces with the BMS in two ways: Digital communications (CANBUS) for establishing operational parameters, and by the Charger Safety relay output for providing the “Charge Enable” signal to the charging station.

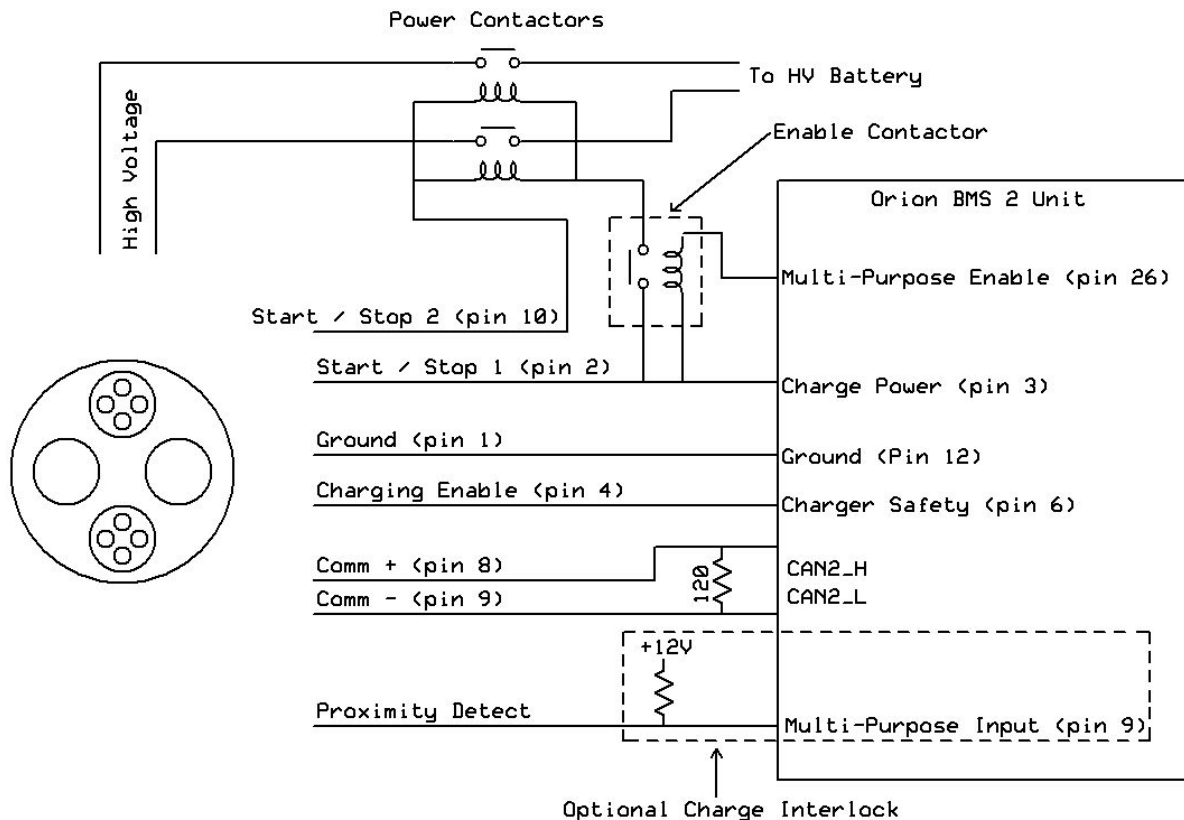


Diagram 1: A typical connection diagram between a CHAdEMO inlet and the Orion BMS 2

## Connecting the Wiring

The diagram above indicates how the Orion BMS would be connected in a typical CHAdeMO charging application, though this may vary from application to application (the integration strategy should be reviewed for applicability to the specific installation).

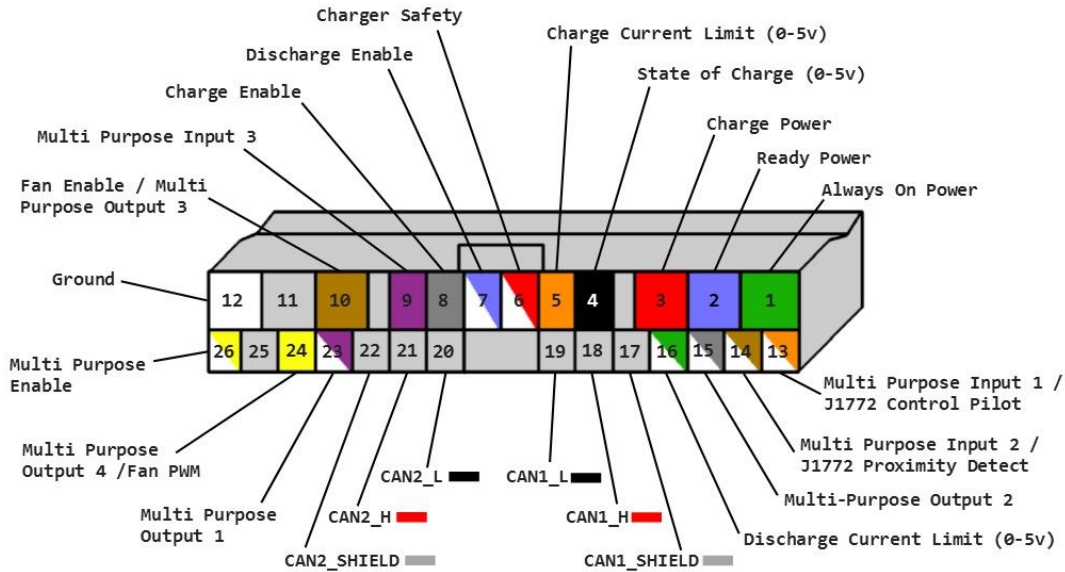


Diagram 2: Wiring pin-out for the Main I/O harness on the Orion BMS 2

**CANBUS Communication** - The CHAdeMO protocol requires the dedicated use of one of the two CANBUS interfaces on the Orion BMS. No devices other than the BMS and the CHAdeMO inlet should be connected to this dedicated network. This is because a CANBUS network requires exactly two termination resistors to operate correctly. The second 120 Ohm termination resistor for the network resides in the CHAdeMO charging station itself, so the only time the CANBUS network would be properly terminated is when the CHAdeMO plug is inserted. Thus any time the CHAdeMO plug is removed, the CANBUS would not be properly terminated and may not function correctly. Often the CAN2 interface on the Orion BMS is used for this purpose, though either CANBUS interface may be used. The CAN1 interface comes with internal termination by default, where-as the CAN2 interface on the BMS does not (unless the BMS has been specially ordered with a different internal termination configuration). An external 120 Ohm termination resistor may need to be installed on the BMS side to provide correct termination if the CAN2 interface is used (though the BMS may be special ordered with CAN2 termination installed internally). Whichever CANBUS interface is used should be connected to the Comm + / - (pins 8 and 9) on the CHAdeMO inlet.

**Charging Enable** - The Charging Enable input on the CHAdeMO inlet (pin 4 on the CHAdeMO inlet) should be connected to the Charger Safety output on the BMS (pin 6 on the Main I/O harness). The Orion BMS will pull this output low when charging is permitted which in turn will cause the CHAdeMO station to know it is OK to begin charging.

**Ground** - The Ground line input on the CHAdeMO inlet (pin 1 on the CHAdeMO inlet) must be connected to the BMS ground (pin 12 on the BMS Main I/O harness) and should also be connected to chassis ground. This is a very important step in order to ensure proper operation.

**Start / Stop 1** - This pin sources (provides) +12vDC from the CHAdeMO charging station when charging is ready to start. It can be used to provide Charge Power +12v to the BMS (connected to Pin 3 on the Main IO harness). It is also the power source used to power (enable) the 2x onboard enable contactors inside the vehicle. If other charging methods are also being used and those other methods may power the BMS as well, it may be necessary to use a diode on this line to prevent backfeeding the CHAdeMO charger (or the other charging method.)

**NOTE: The 2x onboard contactors between the CHAdeMO inlet and the battery pack are required by the protocol and are not optional.** It is equally important to select appropriately sized contactors to use that are rated for the full voltage range and breaking the full theoretical output current (though the selection of these contactors is beyond the scope of this document and what Ewert Energy Systems can officially recommend).

**Start / Stop 2** - This line provides the ground leg for the 2x onboard enable contactors inside the vehicle. This allows the CHAdeMO charging station to engage the onboard contactors directly (together with the Start / Stop 1 signal which provides the +12v source). Do not use this ground leg for any other purpose than the two onboard contactor coil grounds.

**Enable Contactor (or relay):** The latest CHAdeMO standard now calls for a relay or contactor (disconnect) controlled by the BMS that interrupts the Start / Stop 1 (pin 2) power from the contactors between the charging station and the vehicle battery. The BMS has control over this Enable Contactor which allows the BMS to interrupt power to the contactors directly in the event that there is a fault within the pack. It is recommended that the Multi-Purpose Enable output on the BMS be used to control this relay and selecting the "Contactor Enable Output" function. The "Contactor Enable Output" option on the BMS will cause the BMS to turn off the output in the event that a critical fault occurs. The critical fault may be a cell going over a maximum (or under a minimum) voltage for more than 10 seconds or a temperature sensor going too hot (or cold) for more than 10 seconds or any other critical fault.

**Proximity Detect** - This pin is used by the CHAdeMO charging station to signal to the vehicle that it is plugged in, even if power is not present at the charging pins. Typically this signal would interface with the main vehicle controller so it knows not to allow the vehicle to drive away when the plug is connected. The line will be connected to the ground pin on the CHAdeMO inlet

whenever a plug is inserted. It can be optionally interfaced with the Orion BMS multi-purpose input with the use of a pullup resistor as shown in the diagram. The pullup would typically be in the 1k to 10k ohm range, but may vary based on the application. Setting the “Charger plugged in status” option for the Multi-Purpose input will signal to the BMS that the plug is connected to allow the BMS to know to cause a charge interlock condition.

**For more details, please see the official CHAdeMO Interfacing Guide:**

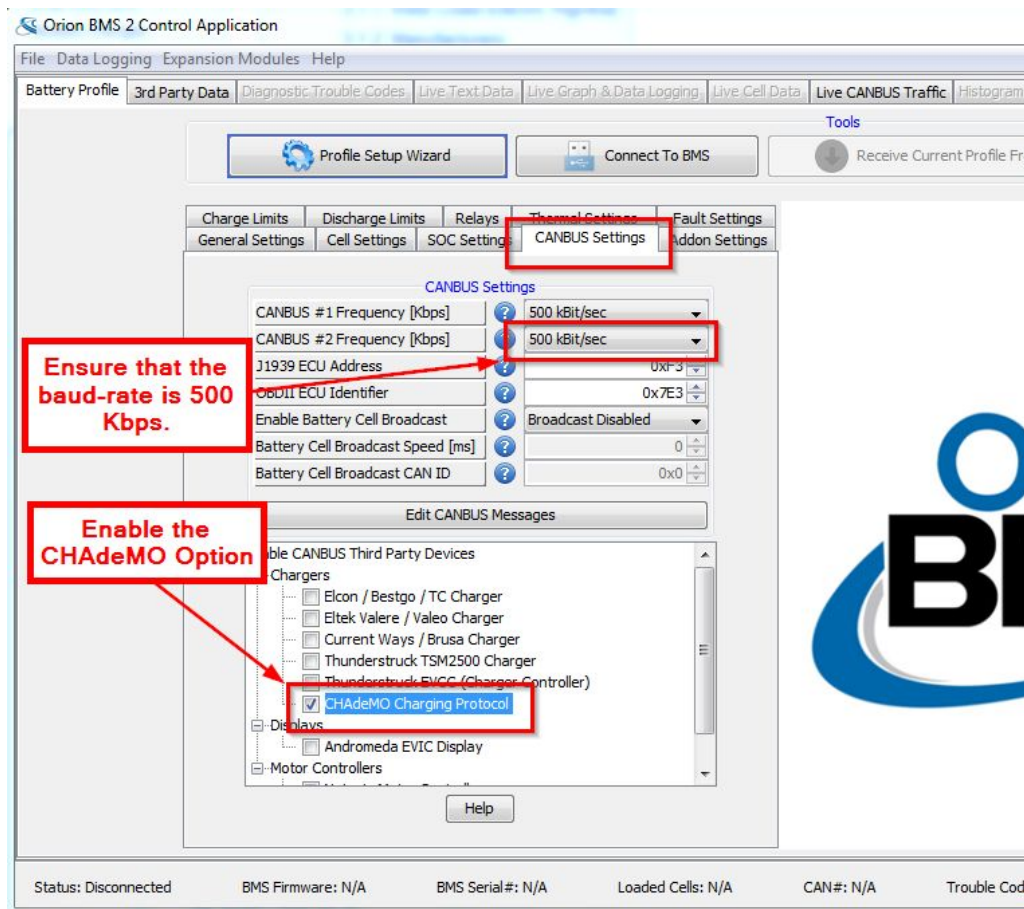
<http://www.chademo.com/pdf/interface.pdf>

**Please see the following pages for configuring the BMS profile settings to enable CHAdeMO support**

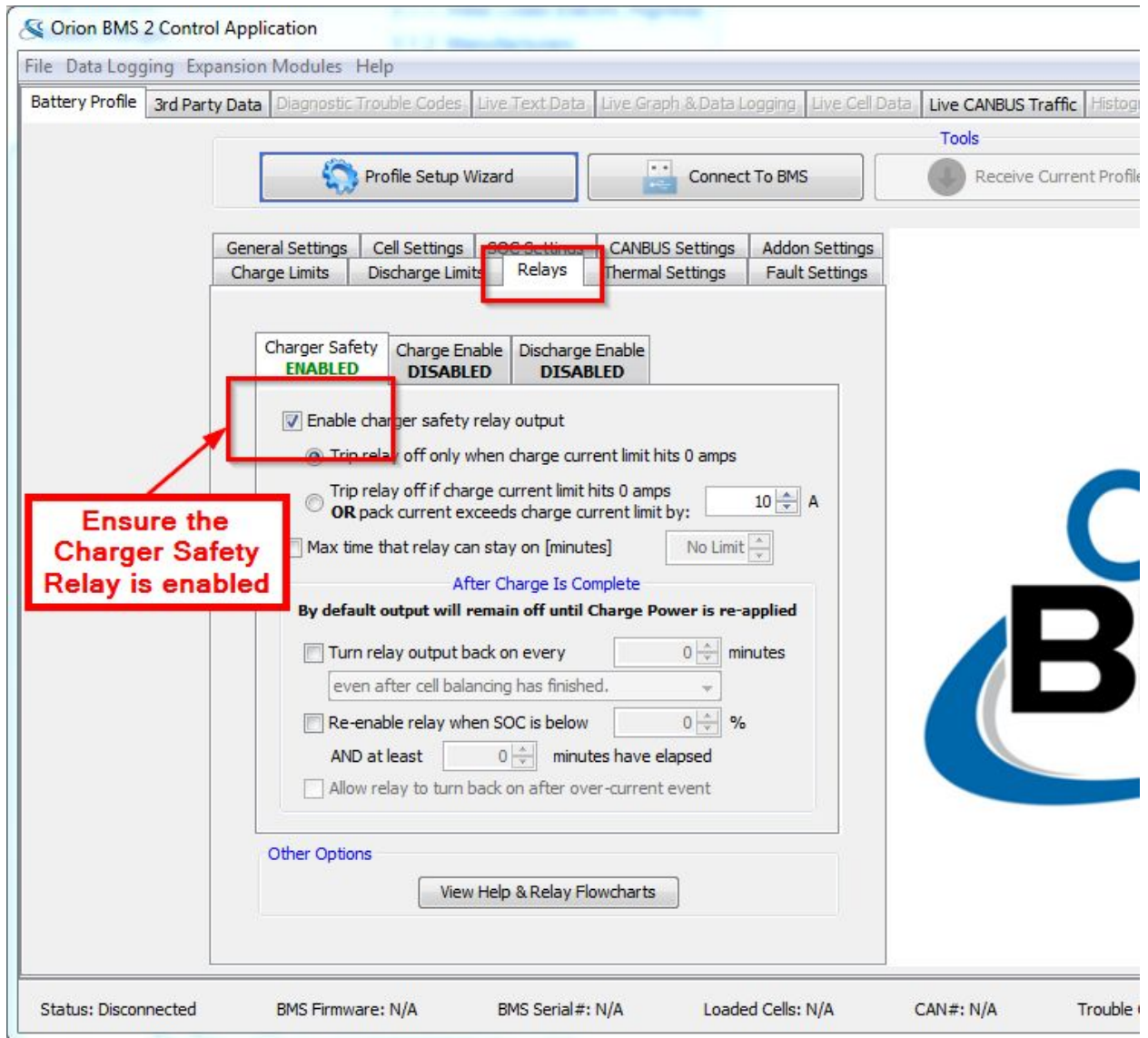
# Configuring the Software

Enabling CHAdeMO support in the Orion BMS 2 utility is very straight forward.

- 1) Open the Orion BMS 2 software utility.
- 2) Click on the “CANBUS Settings” tab on the Battery Profile screen.
- 3) Verify that the CANBUS baud-rate for the interface being used is configured at 500 Kbps (a requirement for CHAdeMO).
- 4) Enable the “CHAdeMO Charging Protocol” option under the “Third Party Devices” list.



- 5) Click on the “Relays” tab in the Battery Profile screen.
- 6) Verify that the Charger Safety relay output is enabled (this is used to control the CHAdeMO Charging Enabled input and must be enabled).



- 7) Once these changes are complete, send the new profile settings to the BMS by clicking the “Send Current Profile to BMS” button in the top right corner.

**IMPORTANT NOTE:** The above instructions assume you are already editing the most recent / current battery profile settings. Please make sure to download the existing settings from the BMS prior to making changes to ensure that nothing gets overridden.

The CHAdeMO integration should now be complete. Make sure to properly and thoroughly test the configuration before leaving it unattended at a charging station. **Because the BMS is directly controlling the charging station, an incorrectly programmed or configured BMS profile could result in extensive damage to the battery pack.**