



Basic Display Module Product Manual

Revision 1.3



An Ewert Energy Systems, Inc Product

The Orion BMS and this display module are designed and manufactured by Ewert Energy Systems, Inc. Ewert Energy Systems is a research & development company focusing on developing solutions for plug-in hybrid and electric vehicles and other energy storage applications. Ewert Energy provides custom solutions as well as off the shelf components.

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Product Description

The Basic Display module for the Orion BMS / Orion Jr. BMS provides visual feedback of the essential information on a battery pack. This information includes State of Charge, Power Limited (reduced output power) and the Malfunction Indicator Status (error indicator).

Product Specifications

- Operates with the Orion BMS or Orion Jr. BMS from Ewert Energy Systems (BMS sold separately).
- Full automotive operating temperature range (-40C to 80C).
- Compact size and shape.
- Uses only the analog output signals from the BMS (no digital communication).
- Supports brightness dimming for automotive use.

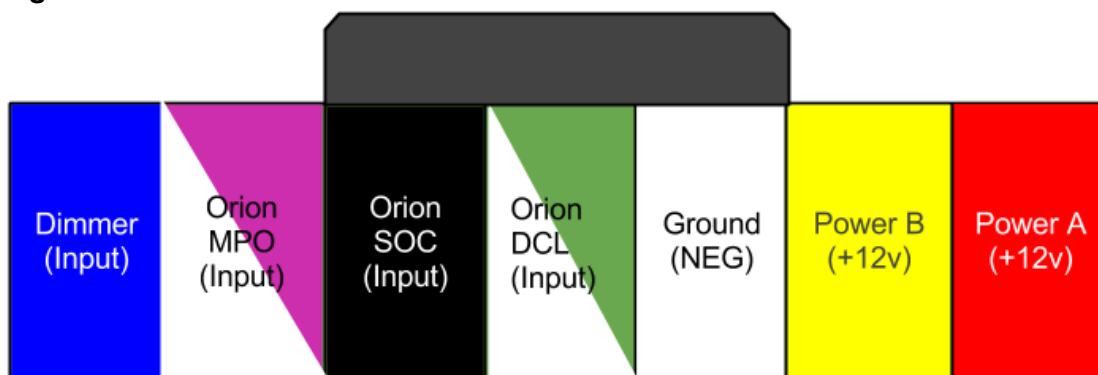
Ordering Options

The Basic Display module can be ordered without an enclosure for easy integration into other enclosures. Contact Ewert Energy for this ordering option.

Installation & Wiring

The diagram below includes some signal wires that come from the Orion BMS. For information on signals connecting to the Orion BMS, please consult the Orion BMS wiring diagram (available at <http://www.orionbms.com/support>).

Wiring Diagram

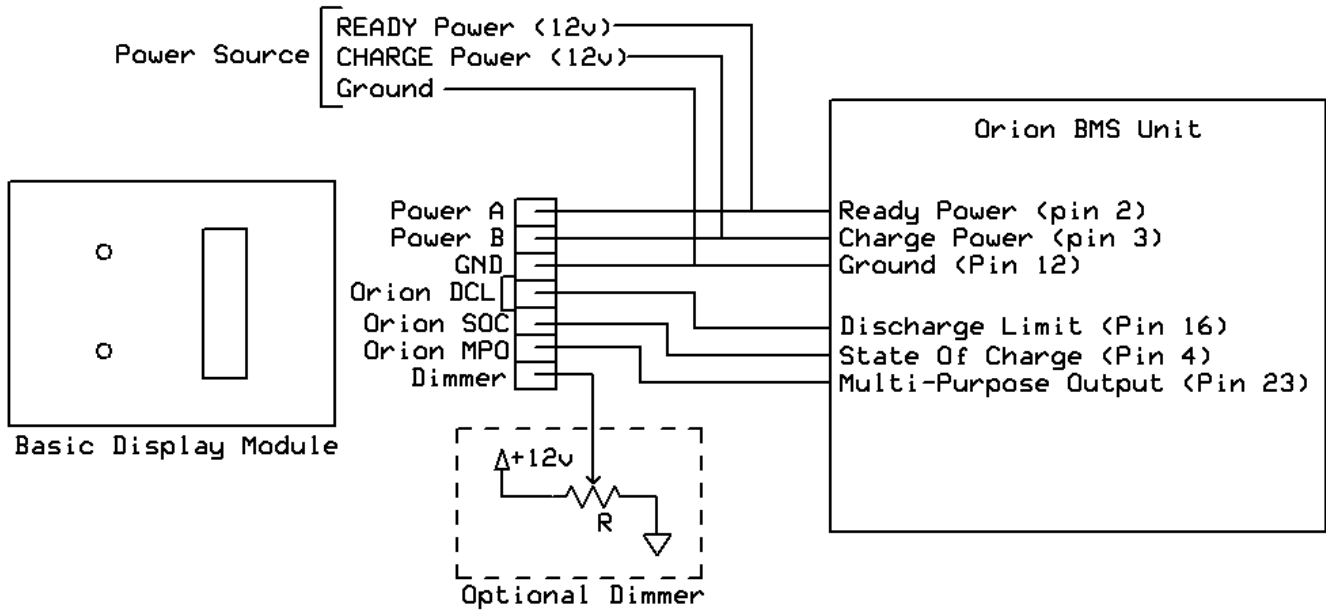


Looking into back of connector (wires coming towards viewer)

Description of Wiring Connections

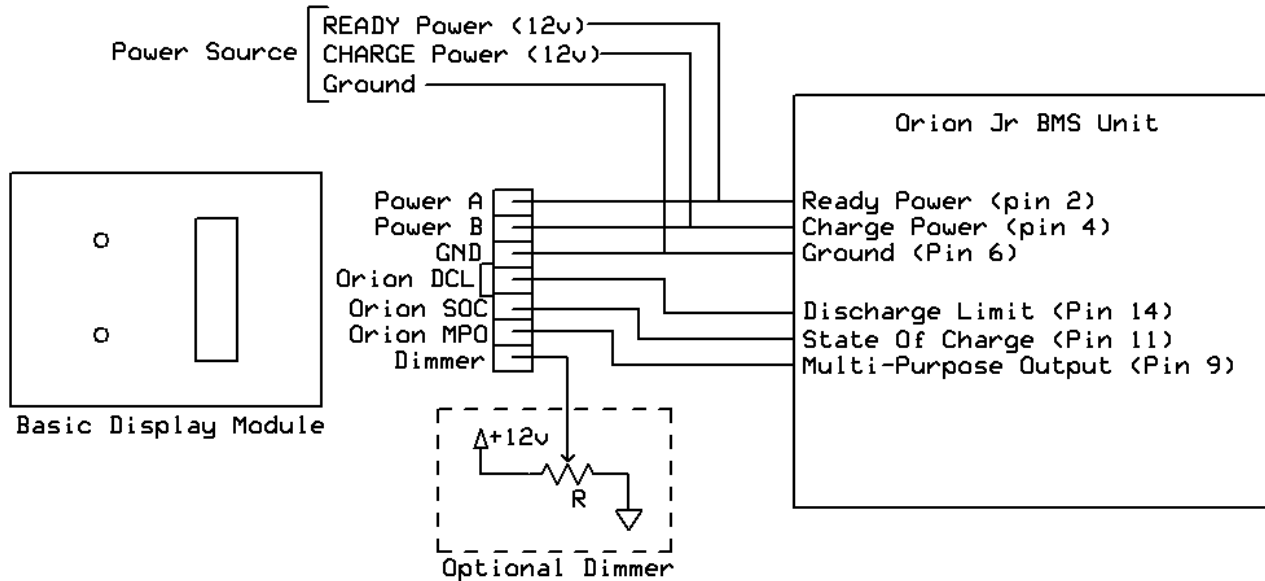
Signal Name	Description
Power A (+12v)	This is power source A for the display module and should read approximately +12v. Either power source fully powers the display and will not back feed the other power source.
Power B (+12v)	This is power source B for the display module and should read approximately +12v. Either power source fully powers the display and will not back feed the other power source.
Ground (NEG)	12V Power ground for the display module. This ground must be connected to the Orion BMS ground.
Orion DCL	Connect to the "Discharge Current Limit" analog output from the Orion BMS (Main I/O pin 16) or Orion Jr. BMS (pin 14). It should measure 0v to 5v depending on the Discharge Current Limit calculated by the Orion BMS.
Orion SOC	Connect to the "State of Charge" analog output from the Orion BMS (Main I/O pin 4) or Orion Jr. BMS (pin 11). It should measure 0v to 5v depending on the State of Charge calculated by the BMS.
Orion MPO	This should be connected to the "Multi-purpose" output signal from the Orion BMS (Main I/O pin 23) or Orion Jr. BMS (pin 9). It is pulled to ground when the BMS detects a fault condition, which will illuminate the display's "Error" LED. The BMS must be configured to output an error indicator on the Multi-purpose output pin.
Dimmer Input Signal	This signal controls the brightness of the LEDs on the display module. 0V (or unconnected) = full brightness; 12v = dim. A variable resistor or fixed voltage signal can be used to dim the display. Leave disconnected for full brightness.

Standard Connection to the Orion BMS



Standard Connection to the Orion Jr. BMS

Note: Max. Supply voltage for Basic Display is 12v



System Operation

When powered, the basic display module will constantly monitor the 4 data inputs from the Orion BMS unit and display the appropriate information on the display. The bargraph represents the measured voltage at the State of Charge pin, the yellow reduced power indicator represents if the battery is unable to output full power and the error indicator illuminates if the BMS detects errors.

Description of LED illuminations

- SOC bargraph LEDs (1-10 LEDs correspond to 0-100% SOC.) This represents the analog voltage measured at the "Orion SOC" input. 0v = 0 bars, 5v = 10 bars.
- Yellow power limited LED illuminates if the measured Discharge Current Limit drops below 70% of the maximum discharge current limit (the 70% threshold can effectively be changed by altering the configurable in the Orion BMS battery profile, please see the software utility manual for details).
- The red error indicator LED illuminates if the Orion BMS has detected a fault condition with the battery pack (error code).
- The dimmer input signal allows for the brightness of the LEDs to be dimmed to support night-time usage in automotive applications. 0V = full brightness, 12V = fully dimmed.

Alternate Functionality

The hardware on the basic display module is compatible with other 0-5V analog signals. Please see the list below for alternative configurations:

- The "Orion State of Charge" signal may be substituted by either the "Orion Discharge Current Limit" signal or the "Orion Charge Current Limit" signal to provide a bargraph representation of either limit.
- The "Orion State of Charge" signal may be substituted by the "Orion Amperage" signal from the Orion BMS (see Orion BMS wiring diagram for details) for a bargraph representation of the pack amperage. The 0 amperage condition (no current flowing) results in a half-filled bargraph.
- The "Orion Discharge Current Limit" signal may be substituted by the "Orion Charge Current Limit" signal to indicate when the Charge Current Limit (CCL) is reduced (via the yellow "Reduced Power LED").

Troubleshooting

Problem Symptom	Likely Causes & Solutions
None of the LED indicators will turn on.	<ul style="list-style-type: none"> • Verify that least one of the power sources (A or B) is powered with +12v DC. Also verify that the ground to the basic display module is connected properly. • Verify that the necessary signals from the Orion BMS are properly connected. • Verify that the Orion BMS is powered and active.
The "Reduced Power" indicator LED is always illuminated.	<ul style="list-style-type: none"> • Check the configuration of the "Maximum Analog Output DCL" parameter in the Orion BMS. If this is not set properly, the reduced power indicator could operate continuously or fail to illuminate. • The indicator will turn on if the measured Discharge Current Limit output drops below 70% (below 3.5v measured). Measure the "Orion Discharge Current Limit" signal with a multi-meter to determine the actual voltage coming in. • Battery output is typically reduced in cold or extreme hot weather. The BMS may actually be reducing the output limits to protect the battery in these conditions. Check the "Discharge Current Limit" parameter on the BMS. If this parameter is lower than 70%, the light is correctly illuminating.
The display module will not turn off.	<p>The data logging display module is designed to stay on whenever it is powered (it can be powered by "Power A" or "Power B"). To turn the display module off, ensure power is removed from both power sources. Only one power source is necessary to turn on the display.</p>

Electrical & Product Specifications

Product Dimensions

2.7 in [6.9 cm] (W) x 1.9 in [5.0 cm] (L) x 0.78 in [2.0 cm] (H)

Product Weight

1.5 oz

Electrical Specifications

Item	Min	Typ	Max	Units
Supply Voltage	10		16	Vdc
Operating Temperature	-40		80	C