



## Basic Display Module

# Product Manual



### **Product Description:**

The Basic Display module for the Orion 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:**

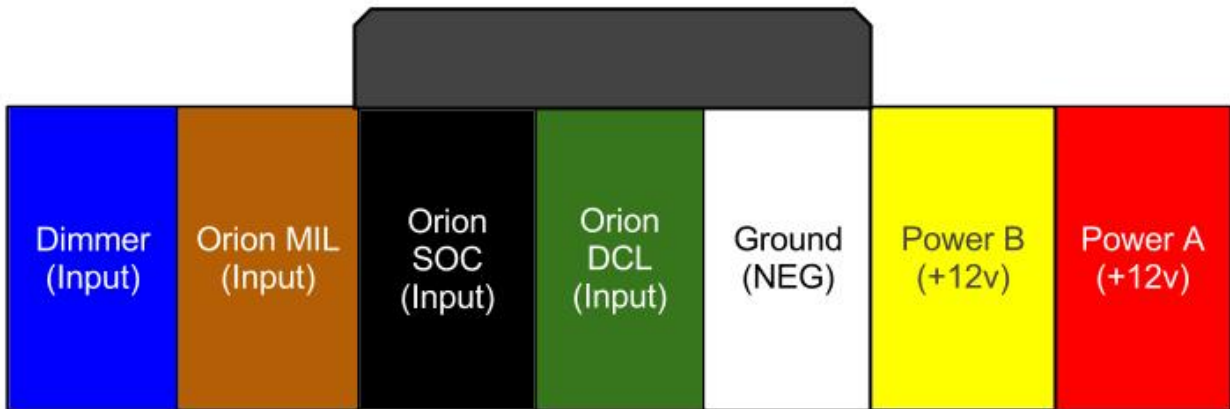
- Operates with the Orion BMS from Ewert Energy Systems (BMS sold separately).
- Full automotive operating temperature range (-40C to 80C).
- Compact size and shape.
- Uses only the analog output signals from the Orion BMS (no digital communication).
- Supports brightness dimming for automotive use.

# Installation & Wiring

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

## Wiring Diagram

Looking into back of connector  
(wires coming towards the viewer)



Signal Name	Description
Power A (+12v)	This is the power source for the display module and should read approximately +12v.
Power B (+12v)	This is the secondary power source for the display module (optional) and should read approximately +12v if used.
Module Ground	This is the power ground for the display module.
Orion Discharge Current Limit Signal	This should be connected to the "Discharge Current Limit" analog output from the Orion BMS. It reads 0v to 5v depending on the Discharge Current Limit calculated by the Orion BMS.
Orion State of Charge Signal	This should be connected to the "State of Charge" analog output from the Orion BMS. It reads 0v to 5v depending on the State of Charge calculated by the Orion BMS.
Orion Malfunction Indicator Signal	This should be connected to the "Malfunction Indicator" output signal from the Orion BMS. It is pulled to ground when the Orion BMS

	detects a fault condition, which will illuminate the "Error" LED on the display module.
Dimmer Input Signal	This signal is connected to an external pot (variable resistor) to control the brightness of the LEDs on the display module.

## System Operation

When the basic display module is powered, it will constantly be updating the bargraph (10 segment LED indicator) to represent the measured State of Charge (SOC%). Additionally, it will constantly be measuring the Discharge Current Limit (DCL) for a reduced power condition (yellow LED indicator).

Description of LED illuminations:

- SOC bargraph LEDs (1-10 corresponds to 0-100% SOC).
- Yellow power limited LED illuminates if the measured Discharge Current Limit drops below 70% of the maximum discharge current limit (the maximum limit is configurable in the Orion BMS battery profile, please see the software utility manual for details).
- The red malfunction indicator LED illuminates if the Orion BMS has detected a fault condition (error code).
- The dimmer input signal allows for the brightness of the LEDs to be dimmed to support night-time usage in automotive applications.

## Alternate Functionality

The hardware on the basic display module is compatible with several other signals. Please see the list below for suggested alternative configurations:

- The "Orion State of Charge" signal may be substituted with 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 with 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 with the "Orion Charge Current Limit" signal to indicate when the Charge Current Limit (CCL) is reduced.

# Troubleshooting

<b>Problem Symptom</b>	<b>Likely Causes &amp; Solutions</b>
None of the LED indicators will turn on.	<ul style="list-style-type: none"><li>• 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.</li><li>• Verify that the necessary signals from the Orion BMS are properly connected.</li><li>• Verify that the Orion BMS is powered and active.</li></ul>
The "Reduced Power" indicator LED is always illuminated.	<ul style="list-style-type: none"><li>• Check the configuration of the "Maximum Analog Output DCL" parameter in the Orion BMS. If this is not set properly then the reduced power indicator could operate continuously.</li><li>• The indicator will turn on if the measured Discharge Current Limit output drops below 70% (which would be below 3.5v measured). Measure the "Orion Discharge Current Limit" signal with a multi-meter to establish what the voltage coming in actually is.</li><li>• 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.</li></ul>
The basic display module will not turn off.	<ul style="list-style-type: none"><li>• The basic display module is designed to stay on whenever it is powered (it can be powered by "Power A" or "Power B"). To turn the basic display module off, remove power from both power sources.</li></ul>

# 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)

Item	Min	Typ	Max	Units
Supply Voltage	10		16	Vdc
Operating Temperature	-40		80	C
Display Module Weight		11		oz



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## An Ewert Energy Systems, Inc Product

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