

Enerdrive & Morningstar

Introduction:

With over four million sold since 1993, Morningstar is recognized as the expert in charging technology throughout the solar industry. As solar-plus-storage becomes more prevalent in mainstream installations, battery chemistries are becoming more advanced—and battery makers are increasingly looking for ways to help their customers maintain and protect their long-term investment.

Morningstar's *Energy Storage Partner program* (ESP) makes it possible for selected premium battery partners to offer additional value and support for their customers by offering them a more proven, better documented and controlled storage system. With energy storage typically accounting for a very large share of the overall system's cost, ESP helps advanced chemistry battery manufacturers to provide the maximum level of assurance that system owners and operators need. This document is intended to provide essential information and recommendations for integrating Morningstar charge controllers with the Energy Storage Partner's batteries. Proper integration of these products is dependent upon successful implementation of the custom settings outlined in the sections below. These settings are the result of cooperation between manufacturers and have been agreed upon by both parties.

Battery Overview:

After 2 years of research, testing and proving, and a further 6+ years of infield sales, Enerdrive has designed and created a COMPLETE Lithium Battery & Installation System so your Li-Ion battery bank is fully protected. Most importantly, our system is designed to give the maximum performance, longevity and SAFETY in your valuable installations.

Be aware that the market is abuzz with the hot topic of Lithium Ion Batteries; and we can tell you from our testing to date that all the hype of their performance and capabilities is TRUE. However what we can also inform you is that all the stories of their 'Issues' are unfortunately also true. However the so called "issues" of lithium can be avoided with some very basic rules about protection.

- Never go over voltage whilst charging them
- Never let them go 'Dead' Flat
- Keep the individual cells 'Balanced'

What this lesson taught us is if we were to develop our lithium program – IT HAD TO BE DONE RIGHT. So we developed our own Lithium Power Pack for the Australian market with the emphasis on 'built like a tank'; and even to the extent of being a little bit 'overkill' on the packaging and protection.

Equipment & System Requirements:

- The actual lithium power pack battery box including Active Balancing System.
- The Advance BMS controller board which includes
- The Advance BMS Relay Driver box
- Fuse ports for essential services and charging sources



- The ePRO Plus is our latest generation, highly advanced battery monitor. It consists of an intelligent active shunt and a remote control and display unit (CDU). The shunt has a Grid Optimized footprint for perfect integration with our DC Modular series of high current busbars and fuse holders. The ePRO Plus battery monitor can measure DC currents up to 600Amps (500Amp continuous) and voltages up to 70Vdc. So any lead- or lithium based battery from 12V up to 48V can be monitored.
- A Blue Sea 500amp main battery latching relay which is activated by the ePRO Plus Battery Monitor when the low state of charge (percentage is reached).
- A Class T Fuse for system protection.
- 70 - 120mm² Battery cable (depending on system) from the battery to the Connection Kit.

Models: [EPL-200AH-24V](#), [EPL-200AH-12V-COMP](#), [EPL-200AH-12V-SLIM](#), [EPL-300AH-12V-COMP](#), [EPL-300AH-12V-SLIM](#) & [Installation Connection Kit](#)

Voltages: 12V, 24V

Amp Hour Capacities: 200-300Ah

* **Note:** All models can be configured in Series & Parallel. For information regarding battery bank configuration options, please contact the battery manufacturer.

For optimal integration, the recommended settings (based on 12V nominal values) are as follows:

Critical Settings:

Absorption Voltage = 14.40 V

Absorption Time = 10 min

Temperature Compensation = 0.0 V/degC (Disabled)

Float/Float Voltage/Timeout = Enable/13.50 V/15 min

Equalize = Not enabled

Battery HVD/High Voltage Disconnect/Reconnect = Enable/15.50 V/14.00 V

Load LVD (Low Voltage Disconnect) 12.20 V

Load LVR (Low Voltage Reconnect) 13.00 V

Note:

The Advanced BMS Relay Driver continually monitors the Active Balancing Module/s of the Enerdrive Lithium Battery for any High or Low Cell Voltage errors, and pairing this with the SOC% and overall voltage of the ePRO Plus Battery Monitor, gives the kit the ability to control all charging sources. All loads are monitored and controlled via the ePRO Plus and Advanced BMS Relay Driver.



Optional Recommended Settings:

Absorption Ext = Not enabled

Low Battery Temperature Foldback = Optional (High limit = 1 degC, Low limit = 0 degC)

Battery Service Reminder = Not enabled (Monitor battery health and SoC using [ePRO Plus Battery Monitor](#))

Float Cancel = Not enabled

Max Regulation Limit = 14.80 V

Battery Charge Current Limit = Optional (1C max, 0.3C recommended)

Delay Before Load LVD 5 min

Load Current Compensation Default = 0.015 Ω (V/A)
- Reduces Load LVD based on size of load with respect to battery Ah capacity

Load HVD/High Voltage Disconnect/Reconnect..... Enable/15.50 V/14.50 V

Battery Charge LED Indications (Not intended for accurate SoC measurement):

LED G → G/Y 75%+ = 13.5 V (3.375 V/per cell)

LED G/Y → Y 50% - 74% = 13.3 V (3.325 V/per cell)

LED Y → Y/R 25% - 49% = 13.1 V (3.275 V/per cell)

LED Y/R → R 10% or below = 12.8 V (3.2 V/per cell)

(More information regarding these settings provided by Morningstar)

These settings are available for the Morningstar controllers listed below:

12-24V systems:

ProStar MPPT (includes low temperature foldback to limit the max. charge current)

SunSaver MPPT

ProStar (PWM) Gen 3 (includes low temperature foldback to limit the max. charge current)

12-48V systems:

TriStar MPPT (compatible with 12V, 24V, 36V, 48V, 60V nominal systems)

TriStar MPPT 600V (compatible with 24V, 36V, 48V and 60V nominal systems) **[not compatible w/ 12V]**





TriStar [PWM] (compatible with 12V, 24V, 36V and 48V nominal systems)

Communications hardware required for programming Custom Settings with MSView:

TriStar, TriStar MPPT, TS-MPPT-600V

Includes an RS-232 port for connection to a PC.

EMC-1 Ethernet MeterBus Converter-

<http://www.morningstarcorp.com/products/ethernet-meterbus-converter/>

Tripp Lite U209-000-R USB / Serial DB-9 (RS-232) Adapter Cable (not available from Morningstar)

All TS-MPPT-60 (150V and 600V) models also include an Ethernet port and EIA-485 port.

MSView Software Download: <http://www.morningstarcorp.com/msview/>

MSView Configuration Files:

<https://www.morningstarcorp.com/wp-content/uploads/2019/12/Enerdrive-MSView-Configuration-Files.zip>

Other links:

[Morningstar Best Practices by Battery Chemistry](#)

[Morningstar Custom Settings Info Pages](#)

IMPORTANT:

Enerdrive and Morningstar Corporation are separate companies with unaffiliated ownership.

Neither Enerdrive nor Morningstar Corporation make any warranties explicit or implied with this product information. Morningstar makes no representation or assumption of liability regarding the charging requirements for any type of battery or model.

Some of the material being presented may be based on information that has been provided by other parties such as battery specs and operational parameters.

Performance may vary depending on use conditions and application.