Blue Planet Energy & 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.

Energy Storage System Overview:

Designed, assembled, and tested in Hawaii by Blue Planet Energy, Blue Ion 2.0 is a premium energy storage system that provides unparalleled safety, reliability, and performance. Blue Ion is precisely engineered to offer simple, fast, and repeatable design and installation. It provides the safety of Lithium Ferrous Phosphate (LFP), the confidence of a 15-year performance warranty, and the durability of 100% depth of discharge with no impact on cycle life.

Blue Ion 2.0 offers fire-safe and fail-safe operation. The complete system is certified to the UL 9540 standard for Energy Storage Systems. It delivers maintenance-free operation with no active cell cooling. Blue Ion's high-power Super BMU has an 8 kW continuous power rating, and peak power ratings of 10 kW (30 min.), 11 kW (5 min.), and 17 kW (1 sec.). The system has a peak efficiency of 98%.

Designed for scalability, a fully populated Blue Ion 2.0 cabinet provides 16 kWh of self-contained energy storage capacity rated for 100% depth of discharge. The high-capacity system eliminates exposed, field-installed interconnect cabling. For commercial and industrial applications, Blue Ion cabinets are configurable in parallel for system capacities of up to 448 kWh.

Blue Planet Energy's Blue Ion 2.0 system is built to last. Its 15-year or 8,000 cycle performance warranty, coupled with a 10-year product warranty, is the best in energy storage. Continuous system data capture and validation provide performance assurance. Blue Ion's highly refined remote system monitoring

offers a user-friendly interface for mobile devices, real-time and historical system performance monitoring for end users, and portfolio-level remote monitoring for system integrators.

Models: BI2-08-18U, BI2-12-18U, BI2-16-18U
Voltages: 48V
Amp Hour Capacities: 160Ah, 240Ah, 320Ah

Note: 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 = 13.80 V

Absorption Time = Arbitrary value (regulation voltage maintained indefinitely throughout charging cycle)

Temperature Compensation = 0.0 V/degC (Disabled)

Float = Not enabled

Equalize = Not enabled

Battery HVD/High Voltage Disconnect/Reconnect = Enable/14.40 V/13.80 V

Load LVD (Low Voltage Disconnect) …………………………………….. 12.25 V

Load LVR (Low Voltage Reconnect) …………………………………….. 13.00 V

Note:

Many lithium batteries include a BMS that can implement an internal battery disconnect in the event of a deep discharge to prevent permanent damage to the battery chemistry. It is important that proper low voltage load disconnect settings are used to prevent this from occurring during charging. Damage to the controller due to a battery disconnect during charging is typically not covered under warranty. Incidental damage to loads is also not covered under warranty.

Optional Recommended Settings:

Absorption Ext = Not enabled

Battery Service Reminder = Not enabled (Monitor Ah capacity via web portal or mobile app)

Max Regulation Limit = Not enabled

Battery Current Limit = Optional (Max recommended charge current = 0.8C)

Delay Before Load LVD ……………………………………………….. 1 m (Possibly higher for cold temperatures)

Load Current Compensation ………………………………… Default = 0.001 Ω (V/A), should be calculated based on 0.35/C (Reduces Load LVD based on size of load with respect to battery Ah capacity)

Load HVD/High Voltage Disconnect/Reconnect………… Enable/15.00 V/14.40 V (May help to protect loads from potentially harmful voltage spikes that can be caused by external charging sources continuing to operate during battery removal)

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

> LED G –> G/Y 75% = 13.09 V
>
> LED G/Y –> Y 50% = 13.07 V
>
> LED Y –> Y/R 25% = 12.83 V
>
> LED Y/R –> R 10% or below = 12.68 V

(*More information regarding these settings provided by Morningstar*)

These settings are available for the Morningstar controllers listed below:

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)

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/2018/11/Blue-Planet-MSView-Configuration-Files.zip

Other links:

Morningstar Best Practices by Battery Chemistry

Morningstar Custom Settings Info Pages

IMPORTANT:

Blue Planet Energy and Morningstar Corporation are separate companies with unaffiliated ownership.

Neither Blue Planet Energy 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.