Deka Duration by MK Battery & 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.

Manufacturer and Battery Overview:
Deka Duration is engineered by an Italian manufacturer of lithium batteries for solar applications, based in Florence Italy. With an annual capacity of over 300,000 batteries / year. Deka Duration by MK Battery collaborates with the best manufacturers of solar inverters and chargers.
The new DD5300 batteries series can be monitored via WiFi app and/or can be set via the Bluetooth APP.
Deka Duration offers warranty of 120 months / 6000 cycles (open loop configuration).

Deka Duration Website: https://www.mkbattery.com/products/energy-storage
Model: DD5300
Nominal Voltage: 52 Vdc
Voltage Range (BMS Limits): 48.5Vdc - 58.4Vdc
Watt Hour Capacity: 5.3 kWh
Amp Hour Capacity: 105 Ah
Charge Current Standard/ Maximum: 100Adc/ 110 Adc
Warranty Terms Charge / Discharge Current: 50Adc @ 77°F (25°C) 80% DoD
Maximum of 5 batteries in parallel (open loop)

Storage
Battery Module shall be stored in original packaging, in a clean, level, dry, cool location indoors.
Recommended storage temperature is 77°F (25°C), but different storage ranges are acceptable:

- Range of 14°F to +32°F (-10°C to +0°C) : inspection* and recharge** every three months required
- Range of 32°F to +86°F (+0°C to +30°C) : inspection* and recharge** every six months required
- Range of 86°F to +113°F (+30°C to +45°C) : inspection* and recharge** every three months required

*Inspection parameters – identify the State of Charge (SOC), look for alarms and address accordingly, look for physical damage to the Battery Module.
**Charge at 0.1C up to 50% SOC and then discharge to the limit of SOC allowed by the local regulations.

Suggested SOC 30%~50% when stored on land.
Suggested SOC 30%~50% when stored on land. If shipped by sea, you must refer to the UN38.3 standard; if by road, refer to the local codes

Max SoC for sea shipping is 30%

Low Temperature

A battery that will deliver 100% of rated capacity at 77°F (25°C) will only deliver approximately 75% of rated capacity at +50°F (+10°C).
For safety reasons the battery shall not be recharged below 0°C as normal operation, however it is possible to resuscitate the battery from a Low Voltage status or even a low temperature in case the battery cannot be easily moved.
Up to temperatures below 19.4°F (-7°C) the BMS will only allow 0.05C of charge current only for emergency circumstances and only for a limited time each charging session; at temperatures below 14°F (-10°C) charging is prohibited by the BMS.
The battery is capable of 1C operations for a limited time and within certain temperature levels. As part of the 120 months performance Warranty, Charge and Discharge shall be in the range 20-25°C, < 0.5C
Any usage outside this range is not covered by Performance Warranty

Recommended Custom Settings

TriStar (PWM) and **Tristar-MPPT** controllers are programmed using 12V nominal voltage setpoints with MSView software. The controllers use a multiplier of 4 for 48V batteries.
GenStar MPPT: Programmed with the battery nominal voltage in LiveView. See additional commissioning and programming information for the GenStar MPPT controller at the end of this document.

Charge Control Settings: 12V (48V) [use 12V nominal voltage setpoints with MSView]

Absorption Voltage = 13.65 V (54.6 V)
Absorption Time = 20 minutes
Temperature Compensation = 0.0 V/degC (Disabled)
Float/Float Voltage/Timeout = Enable / 13.6 V (54.4 V) 30 minutes
Float cancel not enabled
Equalize = Not enabled
Battery HVD/HVR; High Voltage Disconnect/Reconnect = Enable; 14.1V/ 13.5V (56.4 V/ 54V)

TriStar (PWM) and GenStar MPPT Load Control Settings:

Load LVD (Low Voltage Disconnect) = 12.65 V (50.6 V)
Load LVR (Low Voltage Reconnect) = 13.1V (52.4V)

Optional Charge Settings:

Absorption Ext, Float Cancel, Battery Service Reminder, Max Regulation Limit = Not enabled
Battery Current Limit: Optional; System Total Max Charge Current ≤ Battery Bank Max Charge Rate

ProStar, ProStar MPPT and GenStar MPPT only:
Low Battery Temperature Foldback = Optional - cold environments (0% Low limit = 0° C, 100% High limit = 2° C)

GenStar MPPT only:
Float Exit Threshold: 54V [Float Timeout with cumulative time below this Threshold]
Battery Current Limit Requires Shunt: No (This will cause a fault if there is no ReadyShunt detected. Select Yes only if ReadyShunt is installed.)

Optional Load Settings:
Load HVD; High Voltage Disconnect/Reconnect: Enable; 15.0V/ 13.8V (60.0V/ 55.4V)
Delay Before Load LVD = 1 min (Possibly longer for cold temperatures)
Load Current Compensation: Disabled; If enabled = 1 / [Total Battery Bank Ah] ohms (V/A) (for 12V)
Example 12V; 200Ah battery = 1/200 = 0.005 ohms (V/A); Multiply by 4 for 48V

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

LED Transitions	MSView 12V Setpoint	Battery Setpoint
Green only	> 13.35 V	> 53.4 V
Green-Yellow	13.2 V	52.8 V
Yellow only	13 V	52 V
Yellow Red	12.65 V	50.6 V
Red only	< 12.65 V	< 50.6 V

These thresholds are more representative of SOC during Bulk Charging. Lower settings can better indicate SOC while the battery is being discharged.
Red only setting should be = or > the LVD setpoint.

Notes:

It is important that Load LVD settings are high enough to prevent a BMS under-voltage cutoff due to self-consumption of the equipment.

A BMS over-voltage cutoff may be caused during voltage regulation if there are imbalanced cell voltages or disconnecting very large loads. This can be a nuisance or cause a problematic voltage surge. If this occurs the Absorption voltage settings should be reduced or the battery cells may need to be balanced. Contact MK Battery for more information about balancing the cell voltages.

Monitoring of the system with Morningstar Live View or MSView and Deka Duration monitoring software is recommended to determine if adjustments to the settings may be considered.

Deka Duration batteries include two configurable dry contacts which can be used to disable charging by disconnecting the Morningstar Remote Temperature Sensor (RTS) before a BMS high voltage disconnect occurs. Please contact Deka and Morningstar support for more information on how to configure the dry contacts to disable charging.

These settings are available for the Morningstar controllers listed below:
GenStar MPPT – Charging and Load Control
TriStar MPPT 600V
TriStar MPPT (150V)
TriStar (PWM) - Charging or Load Control
Relay Driver - Load Control

Communications hardware for programming Custom Settings with MSView:
EMC-1 Ethernet MeterBus Converter- http://www.morningstarcorp.com/products/ethernet-meterbus-converter/
All controllers and Relay Driver include an RS-232 port for connection to a PC.
Tripp Lite U209-000-R USB/Serial DB-9 (RS-232) Adapter Cable (3rd party) for USB PC interface
All TS-MPPT-60 (150V and 600V) models 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/Deka-Duration-MSView-Configuration-Files.zip

Also see: Lithium Iron Phosphate Battery Custom Settings Document

GenStar MPPT Commissioning

When powered up for the first time, the GenStar controller must be commissioned via the built-in digital display. Refer to section 3.5 Commissioning / Initial Configuration in the GenStar MPPT operation manual for details.
Local Meter Display Commissioning Steps

- Select Language
- Enable Ethernet Writes (Allows control commands and custom programming over Ethernet; Can be disabled with Meter-Display)
- Select System Voltage (12V, 24V or 48V)
- Set the UTC Time (Universal Time)
- Set the Local Time Offset for the time zone
- Select NO for BMS Block
- Select Battery Charging Profile (6 LiFePO4-Low) or Custom Settings
- Battery Load (LVD) Profile 50.8/ 53.0V or Custom Settings
- Select NO for RTS Required?
- Reboot the controller after commissioning

GenStar MPPT Setup (requires Installer Access Password = 141):

Monitoring, control, setup and firmware updates for the GenStar MPPT controllers are provided with the built-in meter display and the local LiveView HTML pages (Ethernet). See section 4.0 Configuration of the GenStar MPPT manual for detailed setup instructions.

GenStar settings profiles can be saved and loaded to and from the internal SD card only. See the link below for configuration file with the settings above that can be transferred to an SD card.

GenStar MPPT SD Card Custom Configuration Files: https://www.morningstarcorp.com/wp-content/uploads/Deka-Duration-GenStar-SDCard-LiveView-Configuration-Files.zip

IMPORTANT:

- MK Battery-Deka Duration Batteries and Morningstar Corporation are separate companies with unaffiliated ownership.
- Neither MK Battery Batteries 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 materials presented may be based on information provided by other parties, such as battery specifications and operating parameters.
- Performance may vary depending on use conditions and application.

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