

Discover[®]

ADVANCED ENERGY

Lithium Ion Battery

APPLICATION NOTE:

OPEN LOOP INTEGRATION WITH VICTRON ENERGY

1. Battery Operating Limits	2
1.1 Maximum Battery Operating Limits	2
1.2 Recommended Battery Operating Settings	2
2.0 AES Open Loop Integration with Victron Energy Equipment	2
5.1 Device Settings	2

OVERVIEW

There are some notable differences when configuring your Discover AES installation versus conventional lead acid batteries.

This Application Note provides information about the integration of Discover AES Lithium batteries with Victron Energy systems, including MultiPlus inverter chargers, Quattro inverter chargers and MPPT Charge Controllers, BMV 700 Series Battery Monitor, Venus GX / Color Control GX, VE Configure 3 software and VictronConnect bluetooth application.

Victron Energy reference documents:

- Quattro Inverter Charge Manual
- Multi Inverter Charge Manual
- SmartSolar Charge Controller Manual
- BMV 700 Series Battery Monitor Manual
- Venus GX (VGX) / Color Control GX (CCGX) Manual

Discover reference documents:

- Discover Energy 808-0004 42-48-6650 Data Sheet
- Discover Energy 808-0005 44-24-2800 Data Sheet
- Discover Energy 805-0015 AES LiFePO Battery 44-24-2800 42-48-6650 Manual

Visit discoverbattery.com for the most recent version of published documents.

Certain configuration, installations, service, and operating tasks should only be performed by qualified personnel in consultation with local utilities and/or authorized dealers. Qualified personnel should have training, knowledge, and experience in:

- Installing electrical equipment
- Applying applicable installation codes
- Analyzing and reducing hazards involved in performing electrical work
- Installing and configuring batteries

No responsibility is assumed by Discover Battery for any consequences arising out of the use of this material.

Read AES Battery Manual and Safety instructions before installing the battery.

Read Victron Energy manuals for guidance on product features, functions, parameters and how to use the product safely.

1. Battery Operating Limits

1.1 Maximum Battery Operating Limits

The battery should not be operated outside these operating limits. The BMS will open its internal relay and disconnect the battery if any of these limits are exceeded.

Maximum Operating Limits	44-24-2800	42-48-6650
Continuous Charge Current*	110 Adc	130 Adc
Continuous Discharge Current*	110 Adc	130 Adc
Operating Voltage (Min / Max)	22.4 V / 29.2 V	44.8 V / 58.4 V
Charge Temperature (Min / Max)	0°C / 45°C (32°F / 113°F)	
Discharge Temperature (Min / Max)	-20°C / 50°C (-4°F / 122°F)	
Storage Temperature (Min / Max)	-20°C / 45°C (-4°F / 113°F)	

* Effects of AC Ripple must be taken into consideration when sizing and configuring your system.

▲ NOTE!

Intentional bypassing of BMS to operate battery outside maximum and minimum limits voids warranty.

1.2 Recommended Battery Operating Settings

Although the battery is capable of performing at higher operating limits, the following settings are recommended to maximize battery health and account for unforeseen external conditions.

Recommended Operating Settings	44-24-2800	42-48-6650
Continuous Charge Current	< 78 A	< 92 A
Continuous Discharge Current	< 78 A	< 92 A
Charge Voltage (Bulk/Absorb)	27.2 V	54.4 V
Charge Voltage (Float)	26.8 V	53.6 V
Low Voltage Disconnect	24 V	48 V
Operating Temperature	20°C (68°F)	

2.0 AES Open Loop Integration with Victron Energy Equipment

2.1 Device Settings

AES batteries must be set up to work with Power Conversion and Monitoring devices in either an Open Loop or Closed Loop configuration. The charge and discharge settings in a Open Loop configuration are set up manually through the controller for the Power Conversion device at the time of installation. In a Closed Loop configuration, charge and discharge settings are dynamically controlled by the BMS of the AES Battery over a connection with the Power Conversion device network.

Note: Closed Loop communication with a Power Conversion device network requires the use of a LYNK Gateway Communication device (p/n 950-0015) available from Discover Battery. For details please refer to the appropriate Application Note for your Power Conversion device available from the Discoverbattery.com website, or contact your Discover Battery provider for assistance.

The settings in this document are for an Open Loop configuration with Victron Energy equipment.

The general settings for AES batteries in a Open Loop configuration with Victron devices such as BMV 700 Series Battery Monitor, Multiplus and Quattro Inverter Chargers, and Victron MPPT products are as follows below. Refer to Victron product manuals for the safe and correct operation of products.

BMV 700 Battery Monitor Settings	44-24-2800	42-48-6650
Battery capacity (per battery installed)	installed x 110 Ah	installed x 130 Ah
Charged voltage	26.8 V	53.6 V
Tail current	4%	4%
Charge detection time	1 min	1 min
Peukert exponent	1.05	1.05
Charge efficiency factor	95%	95%
Current threshold	0.1 A	0.1 A
Time to go averaging period	3 min	3 min

Multiplus / Quattro Inverter Charger Settings	44-24-2800	42-48-6650
Battery curve	Select: Fixed	Select: Fixed
Battery capacity (per battery installed)	installed x 110 Ah	installed x 130 Ah
Absorption voltage	27.2 V	54.4 V
Float voltage	26.8 V	53.6 V
Discharge voltage LBCO ⁽¹⁾	24.0 V	48.0 V
Re-charge (minimum)	26.0 V	52.0 V
Max discharge / charge current (per battery installed) ⁽²⁾	installed x (78 A < 110 A)	installed x (92 A < 130 A)
Charge efficiency factor	95%	95%
SoC when bulk finished	95%	95%

(1) Absolute lowest cut off voltage, increase voltage as required.

(2) May be set to lower value if necessitated by charger size

MPPT Charge Controller Settings	44-24-2800	42-48-6650
Battery voltage	24 V	48 V
Max charge current (per battery installed) ⁽³⁾	installed x (78 A < 110 A)	installed x (92 A < 130 A)
Charger enabled	Enabled	Enabled
Battery preset	User Defined	User Defined
Absorption voltage	27.2 V	54.4 V
Maximum absorption time ⁽⁴⁾	6 min	6 min
Float voltage	26.8 V	53.6 V
Equalization voltage	26.8 V	53.6 V
Auto equalization	Disabled	Disabled
Temperature compensation	Disabled	Disabled
Low temperature cut off	5° C	5° C

(3) May be set to lower value if necessitated by charger controller size.

(4) Duration of absorption period after the bulk charge interval, set to the minimum.

▲ NOTE!

When the batteries are operating in Open Loop mode, State of Charge (SOC) triggers should not be used for Gen Run start or stop.

The charge and discharge settings for AES batteries in a Open Loop configuration can be set up manually through the Victron VE Configure 3 software for Quattro and Multiplus inverter chargers at the time of installation using the following recommended parameters:

General Tab	44-24-2800	42-48-6650
Enable battery monitor ⁽⁵⁾	Enable	Enable
SoC when Bulk finished	95%	95%
Total battery capacity (per battery installed)	installed x 110 Ah	installed x 130 Ah
Charge efficiency	95%	95%

Inverter Tab	44-24-2800	42-48-6650
DC input low shut-down ⁽⁶⁾	24.0 V	48.0 V
DC Input low restart ⁽⁷⁾	26.0 V	52.0 V
DC input low pre-alarm ⁽⁸⁾	25.5 V	51.0 V

Charger Tab	44-24-2800	42-48-6650
Enable charger	Enable	Enable
Battery Type	Blank	Blank
Lithium batteries	Enable	Enable
Charge curve	Select: Fixed	Select: Fixed
Absorption voltage	27.2 V	54.4 V
Float voltage	26.8 V	53.6 V
Charge current (per battery installed) ⁽⁹⁾	installed x (78 A < 110 A)	installed x (92 A < 130 A)
Repeated absorption time ⁽¹⁰⁾	0.25 Hr	0.25 Hr
Repeated absorption interval ⁽¹¹⁾	7.0 Days	7.0 Days
Absorption time ⁽¹²⁾	1.0 Hr	1.0 Hr

(5) Used to enable and define the general display of voltage based SoC. However voltage based SoC accuracy is low with AES battery and generator start stop control is not recommended using this feature as the SoC trigger. A Victron BMV Battery Meter is recommended for triggering generator start stop control with AES Battery based on measured SoC.

(6) Absolute lowest operating voltage, increase voltage as required.

(7) Restart voltage after DC input low shut-down, recommended to be set to the minimum value (minimum varies according to the DC Input low shut-down value).

(8) 51.0 V value (approximately 25% SoC) will trigger low battery warning, increase or decrease as preferred.

(9) May be set to lower value if necessitated by charger size.

(10) Duration of a repeated absorption period, set to the minimum value.

(11) Duration of maximum Float period or Interval between a repeated absorption cycle.

(12) Duration of the absorption period after a bulk charge period, set to the minimum.