

OutBack Chargers with Discover Batteries

The following pages detail specific settings and methods used when integrating a Discover AES battery with OutBack equipment in an open loop configuration. For information on closed loop communication, please refer to the Discover website. Also found in the paper is a discussion of ‘best fit’ FLEXnet DC (FN-DC) settings and state of charge monitoring with lithium batteries.

If using a FLEXPowerr Radian system or a SkyBox, configuration files are provided on the OutBack Power website for download with the applicable settings. See the WattSchool YouTube videos titled “How To: Save or Restore a Configuration” or “SkyBox: Save & Load Configuration”.

Integrating with a Radian/FXR

The following charge settings are recommended when pairing a Discover AES battery with a single Radian or FXR system. Please consult the *MATE3s Programming Guide* for detailed instructions on how to adjust the settings.

Inverter	
Absorb Voltage and Time	54.4 Vdc / 0.5-3.0 hr ¹
Float Voltage and Time	53.6 Vdc / 0.0 hr
Re-float Voltage	N/A
Re-bulk Voltage	50.0 Vdc
AC Charger Limit (A _{AC})	30 Aac
Low Battery Cutout	48.0 Vdc
LBCO Delay	5 seconds
Low Battery Cut-in	51.2 Vdc
High Battery Cutout	58.0 Vdc
HBCO Delay	5 seconds
High Battery Cut-in	56.0 Vdc
Sell RE Voltage	53.2 Vdc
Charge Controller	
Absorb Voltage	54.8 Vdc / 0.5-3.0 hr
Float Voltage	54.0 Vdc
Re-bulk Voltage	50.4 Vdc
DC Current Limit	60/80/100 Adc ^{2,3}
Absorb End Amps	0 Adc
FN-DC	
Battery Ah	130 Ah / battery
Charged Voltage	54.4 Vdc
Charged Return Amps	6.5 Adc
Battery Charge Efficiency	98%
MATE3s	
FN-DC Advanced	Low SOC Warning = 15%
FN-DC Advanced	Critical SOC Warning = 10%

¹ Absorb time used during testing with 2 Discover AES 48 Vdc batteries was 1.6 hrs.

² Max current limit based on charge controller model.

³ Ensure the maximum battery charging current is not exceeded after all charge controllers are taken into consideration (i.e. – 2 FM100 controllers would charge at 200 Adc total, a violation of the limit if only one 48 Vdc AES is used).

State of Charge Monitoring

Using the settings above, several tests were performed to monitor the accuracy of the OutBack FN-DC against Discover's AES Dashboard. In all scenarios, the FN-DC and AES Dashboard began to diverge when the battery was heavily discharged. When SOC was high (>90%), the average difference between the two measurement devices was between zero and one percent. The greatest average differences occurred at very low SOC (<20%). In most cases, the FN-DC erred low relative to the AES Dashboard.

These tests were conducted in a short term environment. In a long term environment, these percentages may change. To ensure the most accurate SOC data, refer to the AES Dashboard.

Best Practice Operation

When using Discover AES batteries in a grid-tied system with a Radian, the **SelIRE** voltage must be raised above the default value of 52.0 Vdc to prevent the unit from 'selling the battery'. The recommended setting is 53.2V. After a full charge, the Discover batteries rest at approximately 53.5 Vdc. If the sell voltage is 52.0 Vdc, the Radian will see this 1.5 Vdc as an indicator of excess PV production and sell as much as it can until the batteries reach 52.0 Vdc. Because lithium batteries have such a flat voltage profile, this 1.5 Vdc is actually quite a lot. During testing, it was seen with 800 W of incoming PV, the inverter was selling up to 2.5 kW of power in order to reach 52.0 Vdc.



CAUTION: Hazard to Equipment

Temperature compensation should never be used with lithium batteries.

Integrating with a SkyBox

The settings below should be programmed into the unit under the **Custom** choice. Please consult the *SkyBox Programming Guide* for detailed instructions on how to adjust these settings.

Inverter	
Maximum SOC	100%
Minimum SOC	20%
Absorb Charge	Timed
Absorb Voltage	54.8 Vdc
Absorb Time	00:30 – 3:00
Float Charge	Disabled
Float Voltage	Can be left at default
Float Time	Can be left at default
Re-float Voltage	51 Vdc
Re-bulk Voltage	50.4 Vdc
Equalize Voltage	54.4 Vdc
Minimum Equalize Time	00:00
Max Charge Current (Adc)	100 Adc
Grid Charge Limit (kW)	Site specific
Low Battery Cutout	48.0 Vdc
LBCO Delay	5 seconds
Low Battery Cut-in	51.2 Vdc
High Battery Cutout	58.0 Vdc
HBCO Delay	5 seconds
High Battery Cut-in	56.0 Vdc
Battery Series	Custom
Battery Model Number	Custom
Battery Description	Discover AES
Battery Total Amp-Hours	130 × (Number of Batteries)
Charge Efficiency Factor	98%
Absorb End Amps	6.5 Adc

Best Practice Operation

During testing, it was seen that a commissioning charge was necessary to properly calibrate the SkyBox state of charge monitor. If possible, a full load test should also be performed. Each time the battery reaches the low battery cutout voltage, the SkyBox recalculates a state-of-health (SOH) for the battery. This number is used to more accurately track the SOC.



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Further Reading

More information about integrating lithium batteries with OutBack inverters can be found in the application note “Deploying OutBack Equipment with Lithium Ion Batteries.” Additionally, more information specifically related to the Discover AES system can be found in the integration guide published by Discover.

About OutBack Power

OutBack Power is a leader in advanced energy conversion technology. OutBack products include true sine wave inverter/chargers, maximum power point tracking charge controllers, and system communication components, as well as circuit breakers, batteries, accessories, and assembled systems.

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Other

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