How To Set Up Fortress Power Lithium Batteries Using Outback Inverters

Introduction

This integration guide will help set up the charge/discharge parameters of Fortress Power batteries as they relate to Sol-ark inverters, as well as closed-loop communication

Datasheets / Manuals: https://www.fortresspower.com/resources/
Email: techsupport@fortresspower.com
Discord Support: https://discord.gg/kxX6QMjKFw
Phone: (877) 497-6937 x 2
Hours: 8:30AM - 6:30PM EST
Warranty Submittal: https://www.fortresspower.com/product-warranty/

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IMPORTANT! ***Fortress batteries may require disassembly if voltage drops below 40V-44V. OpticsRE, OutBack's free remote monitoring system, can be configured to send an email notification on low battery to help warn and avoid a complete discharge of the battery.***

Radian / FXR Inverter Settings (divide voltage by 2 for 24V FXR settings)

Inverter	80% DoD, 6000 cycles
Absorb Voltage and Time	54.4 Vdc / 2.0 hr
Float Voltage and Time	54.4 Vdc / 0.0 hr
Re-float Voltage	52.4 Vdc
Re-Bulk Voltage	51.2 Vdc
AC Input Mode	Grid Tied (default, adjust as needed)
AC Charger Limit in AC	LFP10: 15 Aac per battery eFlex: 15 Aac per battery eVault: 30 Aac per battery
Low Battery Cut-Out Voltage	49.6V
LBCO Delay	130 seconds
Low Battery Cut-in Voltage	51.2
High Battery Cut-Out Voltage	56.4V
HBCO Delay	10 seconds
High Battery Cut-in Voltage	55.2V
SellRE (Offset) Voltage Max	51.6V for "zero-outflow", 53.6V for selling at "100% full"
Temp Sensors	*Do not use temperature sensors / reduce any temperature coefficients to as close to zero as allowed*

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SkyBox Inverter Settings

The settings below should be programmed into the unit under the ***Custom*** choice.

Inverter	
Maximum SOC	100%
Minimum SOC	20%
Absorb Charge	Timed
Absorb Voltage	54.4 Vdc
Absorb Time	02:00 hr
Float Charge	Disabled
Float Voltage	Can be left at default
Float Time	Can be left at default
Re-float Voltage	54.4 Vdc
Re-bulk Voltage	52.5 Vdc
Equalize Voltage	54.4 Vdc
Minimum Equalize Time	00:00
Max Charge Current (Adc)	LFP-5 & LFP-10: 50Adc eVault: 100Adc eFlex: 55Adc
Max Discharge Current (Adc)	LFP-5 & LFP-10: 90Adc eVault: 125Adc eFlex: 60Adc
Grid Charge Limit (kW)	Site specific
Low Battery Cutout	50 Vdc
LBCO Delay	15 seconds
Low Battery Restart	51.0 Vdc
High Battery Cutout	56.0 Vdc
HBCO Delay	10 seconds
High Battery Cut-in	55.5 Vdc
Battery Series	Custom
Battery Model Number	Custom
Battery Description	Fortress Power
Battery Total Amp-Hours	eFlex: 105Ah LFPP-10: 200Ah eVault: 360 Ah
Charge Efficiency Factor	96%
Absorb End Amps	1Adc

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Charge Controller Settings

Charge Controller	
Absorb Voltage and Time	54.4, 2 hours
Float Voltage	54.4
Rebulk Voltage	52.5 ***note: higher than inverter***
DC Current Limit	LFP-10: 80A per battery ÷ # of controllers eVault: 170A per battery ÷ # of controllers eFlex: 55A per battery ÷ # of controllers
Absorb End Amps	1A

Communication Settings

FLEXnet DC (FN-DC)	***If FLEXNET DC display voltage is not within 0.1V of inverter terminal voltage, calibrate Outback equipment***
Battery Amp hour	eFlex :105Ah per battery LFP-10: 200Ah per battery eVault: 360Ah per battery
Charged Voltage	54.0V
Charged Time	15 minutes
Charged Return Amps	1A
Battery Charge	96%
Relay Invert Logic	No
Relay Voltage	High = 53.8 ; Low = 51.2
Relay Delay	High = 1, Low = 0
MATE3/MATE3s	
FLEXnet DC Advanced	Low SOC Warning = 15%
FLEXnet DC Advanced	Critical SOC Warning = 10%

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Outback CALIBRATION IS IMPORTANT

– the system needs to accurately measure voltages

You can perform calibration through OpticsRE, Mate or the front panel for the inverter and charge controllers. Calibration of the FlexNet requires adjusting a potentiometer with a screwdriver. The instructions provided by outback are included for your convenience but Outback manuals or tech support should be referred to for the most up to date information.

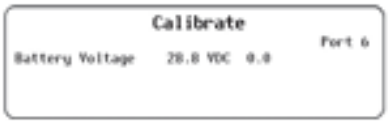
Charge controller calibration

C-7. Calibrate

This menu allows adjustment of the voltmeter. Calibration can improve system performance. Multiple controllers can achieve voltage targets at the same time.

One or more uncalibrated controllers may stop charging because they read the batteries as fully charged. On the FLEXmax 60 or 80 display, this is shown as a mode called "EX-ABSORB." (See the FLEXmax literature for more information.)

- ***Battery Voltage*** — Calibrates the DC voltage measurement made at the controller's battery terminals.



To calibrate the charge controller:

1. Place an accurate DC voltmeter at the battery terminals (not the charge controller terminals).
2. Operate the controller while delivering normal PV current, then adjust the ***Battery Voltage*** setting until the inverter's battery voltage matches the reading on the DC voltmeter.

IMPORTANT:
Calibration does not change the actual voltage of the charge controller, only the reading of that voltage.

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Inverter Voltage calibration

I-13. Calibrate

This menu allows adjustment of the inverter's internal voltmeters. Calibration can improve system performance. Multiple inverters can achieve voltage targets at the same time.

This image shows the readings taken by the inverter in Vac and Vdc. To the right of each value is the calibration setting which adjusts the reading.

The settable range will vary with inverter model. See the inverter literature for specific ranges.

- ***Input Voltage*** — Calibrates the AC voltage measurement made at the inverter's AC input (from an incoming AC source).

NOTE: Radian-class inverters have two ***Input Voltage*** settings due to the dual inputs.

- ***Output Voltage*** — Calibrates the AC voltage measurement made at the inverter's AC output (from the inverter's own power, or from an incoming AC source).
- ***Battery Voltage*** — Calibrates the DC voltage measurement made at the inverter's DC terminals.

To calibrate the battery voltage reading:

1. Place an accurate DC voltmeter at the battery terminals (not the inverter terminals).
2. Operate the inverter at about half power, then adjust the ***Battery Voltage*** setting until the inverter's battery voltage matches the reading on the DC voltmeter.

The AC readings are calibrated similarly at the AC terminals.

IMPORTANT:

Calibration does not change the actual output of the inverter, only the reading of that output.

Calibrating FlexNet DC Instructions:

https://www.outbackpower.com/downloads/documents/appnotes/fndc_field_cal_app_note.pdf

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Fortress Batteries State of Charge to battery voltage

SOC (%)	Unit Voltage
0	<48.5
5	48.8
10	51.2
15	51.68
20	51.84
25	52.16
30	52.32
35	52.32
40	52.48
45	52.64
50	52.64
55	52.8
60	52.8
65	52.8
70	52.8
75	52.96
80	53.12
85	53.12
90	53.12
95	53.28
100	54.4