Setup and Programming

Quick Start Guide

CAUTION: Equipment Damage
These procedures should be done by a qualified installer who is trained on programming inverter power systems. Failure to set accurate parameters for the system could potentially cause equipment damage. Damage caused by inaccurate programming is not covered by the limited warranty for the system.

IMPORTANT
Check the firmware revision of all OutBack devices before use. The Radian inverter and MATE3 system display may not communicate or operate correctly unless their firmware is above a specified revision number. For models GS8048A and GS4048A, the firmware must be revision 001.002.xxx or higher. The MATE3 must be revision 002.017.xxx or higher.

The MATE3 Configuration Wizard allows quick setup of parameters that apply to all systems. The Configuration Wizard is reached from the MATE3 Main Menu as shown to the right.

The firmware revision of all devices can be confirmed by navigating from the MATE3 Main Menu as shown below. Upgrades to the firmware revision can be downloaded from the OutBack website www.outbackpower.com.

Firmware Revision

Configuration Wizard

Grid Tied

Backup

Off Grid

For FN-DC...

Grid Tied Configuration

- System Type: AC, DC, or AC/DC
- System Voltage: 240 VAC
- Battery Type: FLA
- Capacity: 500 Ah
- System Type: Backup
- AC Source: Utility Grid or GS Load Center
- Inverter/Charger: FM10-150VDC
- Controller: GS8048A
- Communication: FLEXnet DC (FN-DC)
- Pre-wired Back Plane

Backup Configuration

- Grid Connect SOC 60%   Disconnect SOC 95%
- Grid Connect     48.0 VDC   Delay 60 Min
- Grid Disconnect  52.0 VDC   Delay 60 Min
- Maximum Output Load   33 A
- AC Input Breaker Size 50 A
- AC Output Voltage 240 VAC
- Re-Float Voltage  44.0 VDC
- Float Voltage     54.4 VDC  Time  1.0
- Absorb Voltage    57.6 VDC  Time  1.0
- Battery Type  FLA   Capacity 500 Ah
- System Voltage   48 VDC
- System Type    Off Grid
- AC Generator

Existing Configuration   >>
New Configuration   >>
Firmware Update   >>
Configuration Wizard    >>
Settings   >>
MATE3    >>
Charge Controller    >>
Inverter   >>
System   >>
System

Grid Connect
- Grid Connect SOC 60%   Disconnect SOC 95%
- Grid Connect     48.0 VDC   Delay 60 Min
- Grid Disconnect  52.0 VDC   Delay 60 Min
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- Float Voltage     54.4 VDC  Time  1.0
- Absorb Voltage    57.6 VDC  Time  1.0
- Battery Type  FLA   Capacity 500 Ah
- System Voltage   48 VDC
- System Type    Off Grid
- AC Generator

IMPORTANT:
Use safe lifting techniques and standard safety equipment when working with the equipment.  This unit employs mechanical relays and is not ignition-protected.

WARNING: Fire/Explosion Hazard
Do not place combustible or flammable materials within 12 feet (3.7 m) of the equipment.  This unit employs mechanical relays and is not ignition-protected. Fumes or spills from flammable materials could be ignited by sparks.

WARNING: Personal Injury
Use safe lifting techniques and standard safety equipment when working with this equipment.

IMPORTANT:
Clearance and access requirements may vary by location. Maintaining a 36” (91.4 cm) clear space in front of the system for access is recommended. Consult local electric code to confirm clearance and access requirements for the specific location.

Contact Technical Support:
Telephone:  +1.360.618.4363
Email:  Support@outbackpower.com
Website:  www.outbackpower.com

Components Included

FPR-8048A
- Inverter/Charger  GS8048A
- GS Load Center  GSLC175-PV-120/240
- Charge Controller  FM80-150VDC

FPR-4048A
- Inverter/Charger  GS8048A
- GS Load Center  GSLC175-PV-120/240
- Charge Controller  FM80-150VDC

All Models
- System Display and Controller
  MATE3  (with FW-MB3-S mounting bracket)
- Communications Manager  HUB10.3
- Battery Monitor  FLEXnet DC (FN-DC)
- Remote Temperature Sensor (RTS)
- Wall Mount Bracket
- Pre-wired Back Plane

Customer-Supplied Components
- AC Source
  - Utility Grid or AC Generator
- Main Electrical Panel (or overcurrent device for the AC source)
- Electrical Distribution Subpanel (Load Panel)
- Photovoltaic (PV) Array and Combiner
- Battery Bank

IMPORTANT:
Not intended for use with the support equipment.

OutBack Power
Masters of the Off-Grid™
First Choice for the New Grid.

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NOTE: Working gloves are strongly recommended when performing installation steps.

1. Ensure the mounting surface is strong enough to handle 3 times the total weight of all the components. Add plywood or other reinforcing material as necessary to strengthen the surface.

2. Attach the wall bracket. Center the mounting holes on the wall studs. Use all 6 mounting screws to secure the bracket.

3. Lift the inverter high enough that the inverter bracket is above the wall bracket.

4. Lower the inverter so that the top of the back plane flange slips into the wall bracket. Ensure the unit is centered on the wall bracket.

5. Install the mounting screws. See illustration below for preferred locations for maximum mounting strength.

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**AC Wire Sizes and Torque Values**

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Diameter (mm²)</th>
<th>Torque (In-lb)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#14 to #10</td>
<td>2.5 to 8</td>
<td>20</td>
<td>2.3</td>
</tr>
<tr>
<td>#8</td>
<td>10</td>
<td>25</td>
<td>2.8</td>
</tr>
<tr>
<td>#6 to #4</td>
<td>16 to 25</td>
<td>35</td>
<td>4.0</td>
</tr>
<tr>
<td>#3</td>
<td>35</td>
<td>50</td>
<td>5.6</td>
</tr>
<tr>
<td>#2</td>
<td>40</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>#1</td>
<td>50</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>#1/0</td>
<td>70</td>
<td>50</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Outback recommends that conductors be #8 AWG THHN copper, or larger, rated to 75°F (minimum) unless local code requires otherwise.

**Minimum DC Cable based on the DC Circuit Breaker**

<table>
<thead>
<tr>
<th>Circuit Breaker</th>
<th>Cable Size</th>
<th>Torque (In-lb)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>#8 AWG (16 mm²)</td>
<td>35</td>
<td>4.0</td>
</tr>
<tr>
<td>80</td>
<td>#8 AWG (25 mm²)</td>
<td>35</td>
<td>4.0</td>
</tr>
<tr>
<td>125</td>
<td>1/0 (70 mm²)</td>
<td>50</td>
<td>5.6</td>
</tr>
<tr>
<td>175</td>
<td>2/0 (70 mm²)</td>
<td>225</td>
<td>25.4</td>
</tr>
<tr>
<td>250</td>
<td>4/0 (120 mm²)</td>
<td>225</td>
<td>25.4</td>
</tr>
</tbody>
</table>

**Torque Requirements**

<table>
<thead>
<tr>
<th>Circuit Breaker</th>
<th>Stud</th>
<th>Torque (In-lb)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5</td>
<td>25</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>1/4 - 20</td>
<td>35</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>5/16 - 18</td>
<td>50</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>3/16 - 18</td>
<td>225</td>
<td>25.4</td>
<td></td>
</tr>
</tbody>
</table>

**DC Plates**

<table>
<thead>
<tr>
<th>Stud</th>
<th>Torque (In-lb)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper holes (*)</td>
<td>60</td>
<td>6.8</td>
</tr>
<tr>
<td>Lower holes (*)</td>
<td>50</td>
<td>5.6</td>
</tr>
<tr>
<td>Shunt Bolts (–) and GS-SBUS</td>
<td>60</td>
<td>6.8</td>
</tr>
</tbody>
</table>

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**AC Terminals - Inverter**

- AC Terminals - Inverter
- DC Terminals - Inverter
- AC Circuit Breakers
- DC Circuit Breakers
- Ground Fault Detector-Interrupter (GFDI)
- PV Circuit Breakers
- Mechanical Interlock (Bypass)
- Communication Ports
- Auxiliary Terminals
- AC OUT Bus Bar L1
- AC OUT Bus Bar L2
- GRID IN Bus Bar L1
- GRID IN Bus Bar L2
- GEN IN Bus Bar L1
- GEN IN Bus Bar L2
- AC Neutral
- Ground
- DC Positive (+) Plate
- DC Positive (+) Terminals
- PV Negative (–) Terminals
- PV Positive (+) Bus Bars
- DC Negative (–) Plate (GS-SBUS)

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**NOTE:**

The AC neutral bus bar is bonded to the GSLC chassis. If the distribution panel neutral is bonded to ground, remove the bond from the neutral bus bar.

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**Positive Battery Cable Connections**

- Positive (+) Plate
- Bolt 3/8”
- Washer
- Lock Nut

- Positive Battery Cable Connections

- Positive Battery Cable Connections

**CAUTION:**

- Equipment Damage

When connecting cables from the FP-Radian to the battery terminals, make sure to observe the proper polarity. Connecting the cables incorrectly can damage or destroy the equipment and void the product warranty.

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**Negative Battery Cable Connections**

- Negative Battery Cable Connections

- Negative Battery Cable Connections

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**FN-DC LED Indicators**

- Green: 50% (blinks if charge parameters are met)
- Yellow: 20% (blinks)
- Yellow: 20% (holds)
- Red: < 20% off, < 60% solid, < 50% blinks

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**Positive PV Cable Connections**

- Positive PV Cable Connections

- Positive PV Cable Connections

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**Negative PV Cable Connections**

- Negative PV Cable Connections

- Negative PV Cable Connections
**Energize/Startup Procedures**

**Pre-startup Procedures:**
1. Double-check all wiring connections.
2. Inspect the enclosure to ensure no debris or tools have been left inside.
3. Disconnect all AC loads at the backup (or critical) load panel.
4. Disconnect the AC input feed to the GSLC at the source.

**To energize or start the OutBack devices:**
1. Using a digital voltmeter (DVM), verify 48 Vdc on the DC input terminals by placing the DVM leads on and 
2. Confirm that the battery voltage is correct for the inverter and charge controller models.
3. Double-check all wiring connections.
4. Turn on (close) the GFDI circuit breaker.
5. Turn on (close) the DC circuit breakers from the battery bank to the inverter.
6. Turn on (close) the AC output circuit breakers.
7. Verify 120 Vac on the AC output circuit breakers by placing the DVM leads on and .
8. Verify 120 Vac on the AC Output L2 TBB and .
9. Verify 120 Vac on the AC Output L1 TBB by placing the DVM leads on and .
10. Verify 240 Vac between the GRID IN TBBs by placing the DVM leads on and .
11. Verify 240 Vac between the AC Output TBBs by placing the DVM leads on and .
12. If the inverter is in the Off state, turn it On.
13. Turn on the AC disconnects at the backup (or critical) load panel and test the loads.

**De-energize/Shutdown Procedures**

**To de-energize or shut down the OutBack devices:**
1. Turn off (open) the AC circuit breakers.
2. Turn off (open) the DC circuit breakers for the battery.
3. Turn off (open) the PV circuit breakers.
4. Turn off (open) the GFDI circuit breaker.
5. Verify 0 Vdc on the first DC bus by placing the voltmeter leads on and .
6. Verify 0 Vdc on the second DC bus by placing the voltmeter leads on and .
7. Verify 0 Vdc on one PV circuit by placing the voltmeter leads on and .
8. Verify 0 Vdc on the other PV circuit by placing the voltmeter leads on and .
9. Verify 0 Vac on the AC output circuit breakers by placing the voltmeter leads on and .

**WARNING: Lethal Voltage**

The numbered steps will remove power from the inverter and charge controllers. However, sources of energy may still be present inside the GSLC and other locations. To ensure absolute safety, disconnect all power connections at the source.
Wiring

AC Distribution Panel

**Utility Grid**
- L1
- L2
- NEU
- Ground
- Neutral
- Hot L1
- Hot L2

**On/Off Switch or EPO**
- Remove the On/Off jumper to enable the use of switch or Emergency Power Off (EPO)

**AC Generator**
- Generator Start

**AC Subpanel**
- L1
- L2
- NEU
- Ground

**Loads**
- Light

**PV Array #1**
- PV Array #2
- Battery Bank

**FPR-8048A wiring and external system**

**IMPORTANT:** Example only. Actual wiring may vary depending on system details and local electric code. Most factory wiring is not shown.

**NOTE:**
- FMR0 negative (-) is prewired. It connects to the far left shunt. See Negative PV Cable Connections. It can also be installed in the FMR0 controller.
- Positive PV Cable Connections
- EPO
- On/Off Switch
- RTS Cable
- Battery Bank
- Ground
- Battery

**DC LEGEND**
- Battery Positive
- PV Positive
- Ground
- Negative

The FPR-4048A follows the same wiring layout as the FPR-8048A with the following exceptions (reconfigured):
- No DC ground (+) plate is present. A single positive battery cable is used. The positive cable connects to the base of the main DC breaker (with the GFDI cable). See Positive Battery Cable Connections and Installation page.
- A single negative battery (-) cable is used. It connects to the right shunt. A single PV positive (+) and bus bar are used.
- A single PV negative (-) cable is used. It connects to the far left shunt. See Negative PV Cable Connections.