Outback FM60

OutBack Power FM60-150VDC FLEXMax 60 Charge Controller User Manual

Model: FM-60 | Brand: Outback

1. Introduction

The OutBack Power FLEXMax 60 Charge Controller is an advanced Maximum Power Point Tracking (MPPT) charge controller designed to optimize the power harvest from your photovoltaic (PV) array. It features a continuous and active MPPT software algorithm that can increase PV array power yield by up to 30% compared to non-MPPT controllers. This controller is engineered for high performance, efficiency, and versatility in advanced power systems.

Key Features:

- Increases PV Solar Array Output to battery bank by up to 30%.
- Designed for charging from your solar array to battery banks with nominal design voltages from 12 to 60 VDC.
- Fully Programmable and Built-in 128 Days of Data Logging.
- Full Power Output in Ambient Temperature up to 104°F (40°C).
- Highest quality MPPT controller for maximizing your solar system performance.

2. Safety Information

WARNING: Electrical Shock Hazard. Read all instructions carefully before installation and operation.

- Installation must be performed by qualified personnel in accordance with all local and national electrical codes.
- Ensure all power sources (PV array, battery bank, and any AC sources) are disconnected before installation or maintenance.
- Use appropriate personal protective equipment (PPE) including insulated gloves and eye protection.
- Do not operate the charge controller if it has been damaged or exposed to moisture.
- Verify correct polarity for all connections to prevent damage to the unit and connected equipment.
- Ensure adequate ventilation around the unit to prevent overheating.

3. Product Overview

The FLEXMax 60 Charge Controller features a robust design with a built-in, backlit 80-character LCD display for monitoring system status and performance data. It supports a wide range of nominal battery voltages and can step down higher voltage solar arrays to recharge lower voltage battery banks.

Front Panel and Display:

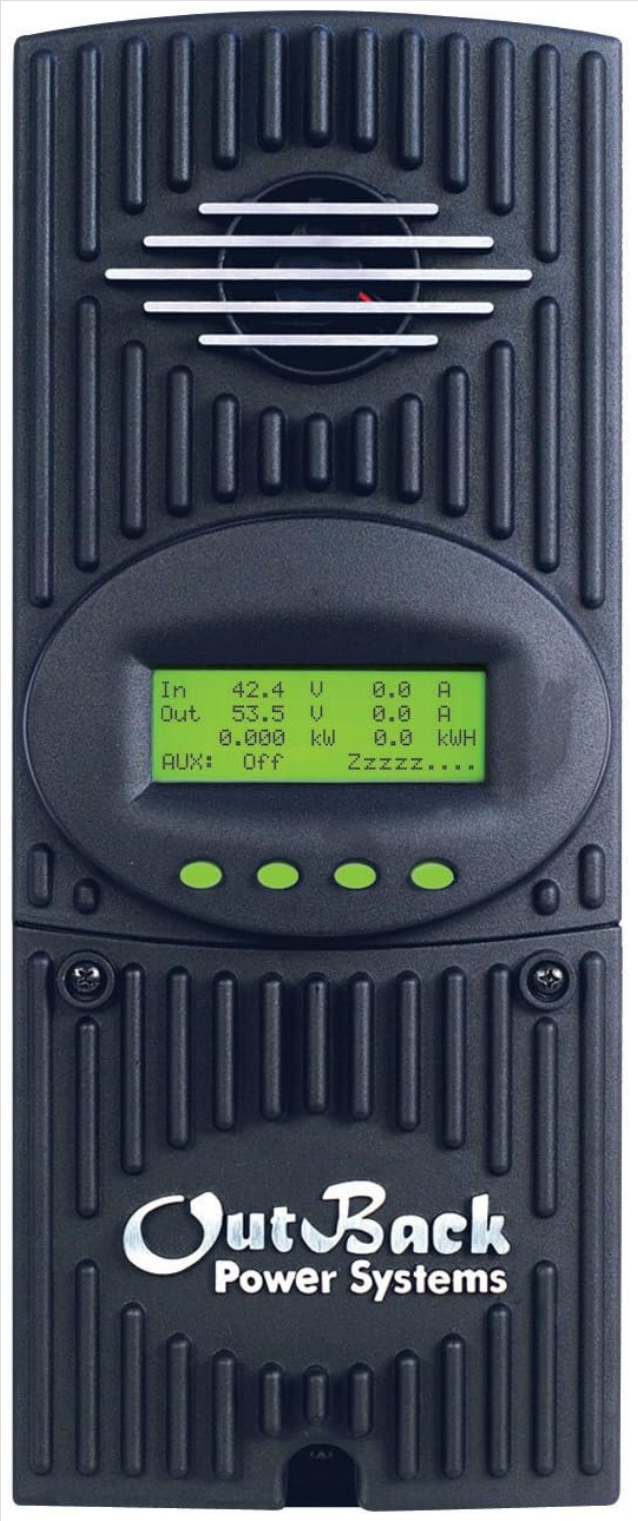


Figure 3.1: Front view of the FLEXMax 60 Charge Controller, showing the integrated LCD display and control buttons.

The LCD display provides real-time information such as input/output voltage and current, power, and energy harvested. Navigation buttons allow users to access various menus for status monitoring, configuration, and data logging.

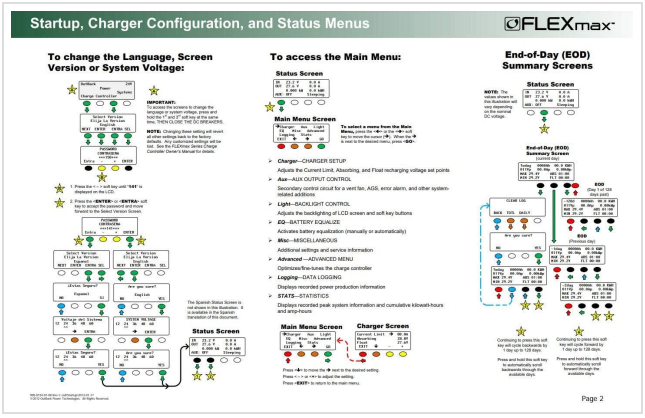


Figure 3.2: Detailed view of the FLEXMax display menus, illustrating navigation and available settings for status, charger setup, AUX output control, equalization, and data logging.

4. Setup and Installation

Proper installation is critical for the safe and efficient operation of your FLEXMax 60 Charge Controller. Refer to the detailed wiring diagrams and instructions provided in the official installation manual for your specific system configuration. Below is a general overview and key considerations.

Wiring Diagram Overview:

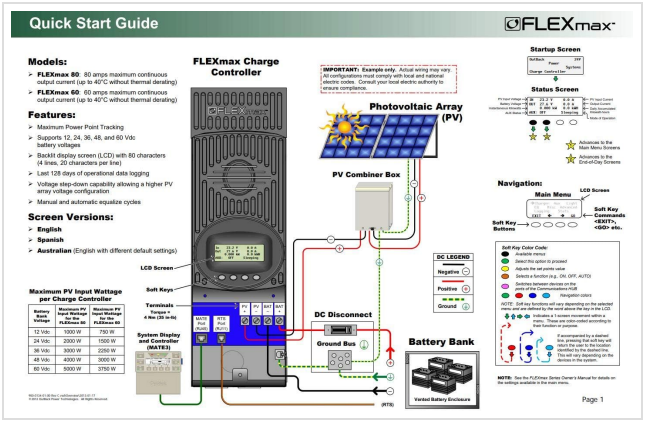


Figure 4.1: Simplified wiring diagram from the Quick Start Guide, showing connections for PV array, battery bank, and system display (MATE3).

Key Installation Steps:

1. **Mounting:** Securely mount the charge controller in a well-ventilated, indoor location, away from direct sunlight and moisture. Ensure sufficient clearance for cooling.
2. **Battery Connection:** Connect the battery bank to the charge controller. The FLEXMax 60 supports 12, 24, 36, 48, or 60 VDC nominal battery voltages, selectable via field programming at start-up. Ensure correct polarity.
3. **PV Array Connection:** Connect the photovoltaic array to the charge controller. The unit can handle up to 150 VDC open circuit voltage from the PV array.
4. **Grounding:** Properly ground the charge controller according to local electrical codes.
5. **System Display (Optional):** Connect an OutBack MATE system display for remote programming and monitoring.
6. **Initial Power-Up:** After all connections are secure and verified, apply power to the battery bank first, then the PV array.

5. Operating Instructions

The FLEXMax 60 operates automatically once configured. The built-in display provides real-time data and allows for parameter adjustments.

Display Navigation:

- Use the navigation buttons (up, down, enter, exit) to browse through the menus.
- The main menu provides access to Status Screen, Charger Setup, AUX-AUX Output Control, EQ-Battery Equalization, Misc-Miscellaneous, Advanced-Advanced Menu, and Logging-Data Logging.
- The Status Screen displays current operational data such as input/output voltage, current, power, and daily/total energy production.

Charging Algorithm:

The controller utilizes a five-stage charging algorithm to optimize battery health and lifespan:

1. **Bulk:** Maximum current charging until battery voltage reaches the absorption set point.
2. **Absorption:** Constant voltage charging to fully charge the battery, with current gradually decreasing.
3. **Float:** Maintains battery voltage at a lower level to prevent self-discharge.
4. **Equalization:** (Manual or Automatic) Overcharges batteries at a higher voltage to balance cell voltages and remove sulfation.
5. **Silent:** Reduces fan speed and noise during periods of low power demand.

6. Maintenance

Regular maintenance ensures the longevity and optimal performance of your FLEXMax 60 Charge Controller.

- **Visual Inspection:** Periodically inspect the unit for any signs of damage, loose connections, or corrosion.
- **Cleaning:** Keep the unit clean and free from dust and debris. Ensure cooling vents are not obstructed.
- **Connection Checks:** Annually check all electrical connections for tightness and integrity.
- **Battery Maintenance:** Follow the battery manufacturer's recommendations for maintenance, including checking electrolyte levels (for flooded batteries) and performing equalizations as needed.

7. Troubleshooting

This section provides guidance for common issues. For complex problems, consult a qualified technician or OutBack Power support.

Common Issues:

- **No Power/Display Off:** Check battery connections and voltage. Ensure the battery bank is adequately charged. Verify all circuit breakers are in the ON position.
- **Low Power Output:** Inspect PV array connections and ensure panels are clean and free from shading. Check for proper PV array voltage.
- **"Stuck Charged" State:** Some users have reported instances where the controller remains in a "Charged" state and does not transition to Float mode, potentially leading to battery depletion. This may

sometimes be resolved by applying a heavy load to the system or by restarting the unit. If persistent, contact support.

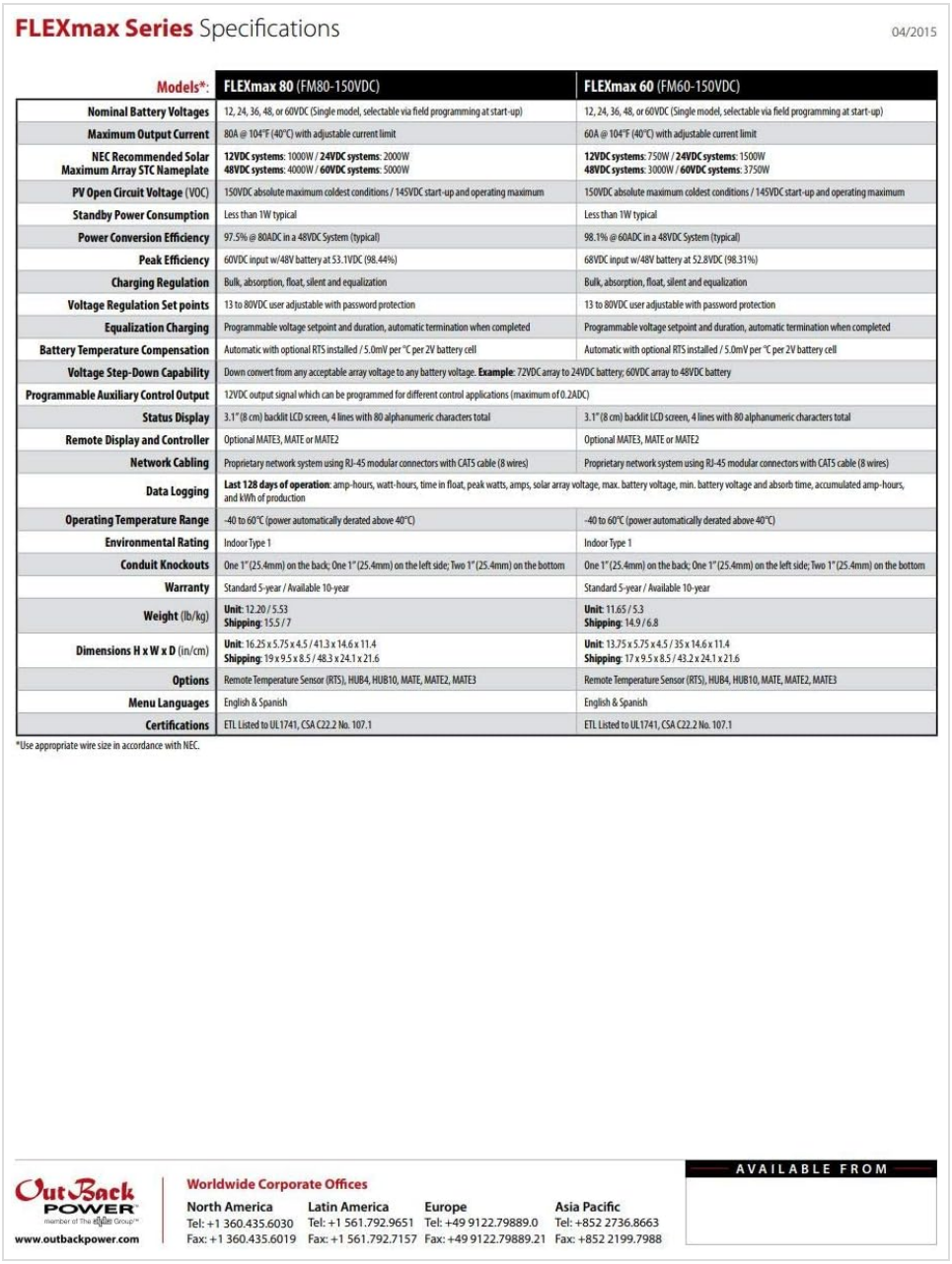
- **Overheating:** Ensure adequate ventilation around the unit. Check for obstructions in the cooling fins or fan.

General Troubleshooting Steps:

1. **Check Connections:** Verify all wiring connections are secure and correctly terminated.
2. **Review Display Messages:** The LCD display may show error codes or status messages that can help diagnose the problem.
3. **Consult Manual:** Refer to the comprehensive OutBack Power FLEXMax 60 manual for detailed troubleshooting guides.
4. **Contact Support:** If the issue persists, contact OutBack Power technical support.

8. Specifications

Detailed technical specifications for the OutBack Power FM60-150VDC FLEXMax 60 Charge Controller.



FLEXmax Series Specifications 04/2015

Models*:	FLEXmax 80 (FM80-150VDC)	FLEXmax 60 (FM60-150VDC)
Nominal Battery Voltages	12, 24, 36, 48, or 60VDC (Single model, selectable via field programming at start-up)	12, 24, 36, 48, or 60VDC (Single model, selectable via field programming at start-up)
Maximum Output Current	80A @ 104°F (40°C) with adjustable current limit	60A @ 104°F (40°C) with adjustable current limit
NEC Recommended Solar Maximum Array STC Nameplate	**12VDC systems**: 1000W / **24VDC systems**: 2000W **48VDC systems**: 4000W / **60VDC systems**: 5000W	**12VDC systems**: 750W / **24VDC systems**: 1500W **48VDC systems**: 3000W / **60VDC systems**: 3750W
PV Open Circuit Voltage (VOC)	150VDC absolute maximum coldest conditions / 145VDC start-up and operating maximum	150VDC absolute maximum coldest conditions / 145VDC start-up and operating maximum
Standby Power Consumption	Less than 1W typical	Less than 1W typical
Power Conversion Efficiency	97.5% @ 80ADC in a 48VDC System (typical)	98.1% @ 60ADC in a 48VDC System (typical)
Peak Efficiency	60VDC input w/48V battery at 53.1VDC (98.44%)	68VDC input w/48V battery at 52.8VDC (98.31%)
Charging Regulation	Bulk, absorption, float, silent and equalization	Bulk, absorption, float, silent and equalization
Voltage Regulation Set points	13 to 80VDC user adjustable with password protection	13 to 80VDC user adjustable with password protection
Equalization Charging	Programmable voltage setpoint and duration, automatic termination when completed	Programmable voltage setpoint and duration, automatic termination when completed
Battery Temperature Compensation	Automatic with optional RTS installed / 5.0mV per °C per 2V battery cell	Automatic with optional RTS installed / 5.0mV per °C per 2V battery cell
Voltage Step-Down Capability	Down convert from any acceptable array voltage to any battery voltage. **Example**: 72VDC array to 24VDC battery; 60VDC array to 48VDC battery	
Programmable Auxiliary Control Output	12VDC output signal which can be programmed for different control applications (maximum of 0.2ADC)	
Status Display	3.1" (8 cm) backlit LCD screen, 4 lines with 80 alphanumeric characters total	3.1" (8 cm) backlit LCD screen, 4 lines with 80 alphanumeric characters total
Remote Display and Controller	Optional MATE3, MATE or MATE2	Optional MATE3, MATE or MATE2
Network Cabling	Proprietary network system using RJ-45 modular connectors with CAT5 cable (8 wires)	Proprietary network system using RJ-45 modular connectors with CAT5 cable (8 wires)
Data Logging	**Last 128 days of operation**: amp-hours, watt-hours, time in float, peak watts, amps, solar array voltage, max. battery voltage, min. battery voltage and absorb time, accumulated amp-hours, and kWh of production	
Operating Temperature Range	-40 to 60°C (power automatically derated above 40°C)	-40 to 60°C (power automatically derated above 40°C)
Environmental Rating	Indoor Type 1	Indoor Type 1
Conduit Knockouts	One 1" (25.4mm) on the back; One 1" (25.4mm) on the left side; Two 1" (25.4mm) on the bottom	One 1" (25.4mm) on the back; One 1" (25.4mm) on the left side; Two 1" (25.4mm) on the bottom
Warranty	Standard 5-year / Available 10-year	Standard 5-year / Available 10-year
Weight (lb/kg)	**Unit**: 12.20 / 5.53 **Shipping**: 15.5 / 7	**Unit**: 11.65 / 5.3 **Shipping**: 14.9 / 6.8
Dimensions H x W x D (in/cm)	**Unit**: 16.25 x 5.75 x 4.5 / 41.3 x 14.6 x 11.4 **Shipping**: 19 x 9.5 x 8.5 / 48.3 x 24.1 x 21.6	**Unit**: 13.75 x 5.75 x 4.5 / 35 x 14.6 x 11.4 **Shipping**: 17 x 9.5 x 8.5 / 43.2 x 24.1 x 21.6
Options	Remote Temperature Sensor (RTS), HUB4, HUB10, MATE, MATE2, MATE3	Remote Temperature Sensor (RTS), HUB4, HUB10, MATE, MATE2, MATE3
Menu Languages	English & Spanish	English & Spanish
Certifications	ETL Listed to UL1741, CSA C22.2 No. 107.1	ETL Listed to UL1741, CSA C22.2 No. 107.1

*Use appropriate wire size in accordance with NEC.

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AVAILABLE FROM

Figure 8.1: Official specifications table for FLEXMax 60 and FLEXMax 80 models.

Specification	Value
Nominal Battery Voltages	12, 24, 36, 48, or 60 VDC (selectable via field programming)
Maximum Output Current	60 amps @ 104°F (40°C) with adjustable current limit
PV Open Circuit Voltage (VOC)	150 VDC absolute maximum coldest conditions / 145 VDC
Standby Power Consumption	Less than 1 Watt typical
Power Conversion Efficiency	98.1% @ 60 Amps in at 48 VDC System voltage
Operating Temperature	Up to 104°F (40°C)
Display Type	LCD (80 character, backlit)
Item Weight	11.65 pounds
Product Dimensions	5.75 x 13.5 x 4 inches
Material	Metal
Manufacturer Part Number	FM60
UPC	847932002050, 733556560024, 025283006068

9. Warranty and Support

The OutBack Power FLEXMax 60 Charge Controller comes with a standard 5-year warranty, with a 10-year extended warranty available. Please refer to your product registration and warranty documentation for full terms and conditions.

Customer Support:

For technical assistance, warranty claims, or service, please contact OutBack Power customer support through their official website or the contact information provided in your product packaging.

Online Resources: Visit the Outback Store on Amazon for additional product information and resources.