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Solar System
Troubleshooting Guide

1. Overview

This document provides troubleshooting guidance for each component of a Sirius solar system, including the solar panels, batteries, charge controllers, fuses, and system wiring.

> ⚠ Important: Before troubleshooting individual components, run Flow-Spec™ to verify whether the system is correctly sized for its operating conditions. An undersized system may exhibit symptoms that resemble component failure.

2. Initial Troubleshooting Steps

Begin with the following general checks before diagnosing individual components.

STEP	ACTION
1	Run Flow-Spec™ to verify the system is correctly sized for the equipment and its operating conditions.
2	Check all fuses to determine if any are blown.
3	Verify all wiring is correct for the system voltage (12V or 24V). Confirm that parallel and series connections are appropriate.
4	Check for loose wires and ensure all connections are secured in terminal blocks. Verify nothing is shorted.
5	Inspect all wiring for damage, corrosion, or oxidation.
6	Disconnect the batteries and check the individual voltage of each.
7	Disconnect the solar panels and check individual voltages and polarity.
8	Verify the open circuit voltage on the solar panel label. Under direct sunlight, the panel should output close to that value.
9	Check that solar panels are facing the correct direction and set to the optimal tilt angle where applicable.
10	Check the status of the SunSaver or Sirius MPPT Charge Controller. Refer to Section 5 Batteries and Section 6 Solar Panels for details.
11	With the pump off, allow the system to charge for 15 minutes. Check if the voltage rises, which confirms the solar panels are charging the batteries.
12	If issues persist after completing all steps, contact Sirius Technical Support.

3. Solar and Battery Sizing

To properly size a solar and battery system, daily energy consumption, desired autonomy (days of power without solar input), and the potential for cloudy days must all be considered.

Use the Flow-Spec™ Excel tool found on the Sirius website to verify whether a system is correctly sized. Flow-Spec™ calculates the theoretical power draw of Sirius equipment under its environmental conditions and outputs a recommended number and size of solar panels and batteries.

Signs of an Undersized System

- Undersized solar panels — panels do not provide sufficient charge to the batteries during daylight hours.
- Insufficient battery bank — the system does not have enough stored power to run for multiple days without a solar charge.

> Systems that are undersized will not maintain operation during extended periods without sunlight. Always verify sizing with Flow-Spec™ before replacing components.

4. Fuses

Fuses protect electrical circuits from overcurrent by breaking the circuit when excessive current flows through them. A blown fuse will interrupt power to the affected circuit.

How to Check a Fuse

Use a multimeter set to resistance or continuity mode:

FUSE CONDITION	MULTIMETER READING
Intact fuse	Very low ohm reading or continuity present
Blown fuse	High resistance, no continuity, or OL (Open Loop) — indicates a broken connection

5. Batteries

Battery issues are a common cause of solar system failures. Use the following checks to determine whether a battery is still serviceable.

Visual Inspection

- Check for physical damage such as discoloration, bulging, broken terminals, or a ruptured case.
- Ensure the top of the battery is clean and dry to prevent discharge across surface grime.
- Look for loose or broken terminals, which can cause short circuits.

Voltage Testing

VOLTAGE READING	INTERPRETATION
~12.4 V	Healthy, fully charged battery
0 V	Possible short circuit
Below 10.5 V after full charge	Dead cell — battery likely needs replacement
12.4 V or less when fully charged	Possible sulfation — severe damage indicator
Drops to 11 V or less under load	Faulty cell — replace battery

If an AGM battery is discharged below 50% of its capacity repeatedly, cell degradation accelerates significantly. Avoid deep discharge where possible.

Common Battery Issues

- Battery will not charge — check for loose connections, faulty terminals, or a problem with the charger.
- Battery will not hold a charge — may indicate sulfation, a dead cell, or a charging system fault.
- Bulging or discoloration — signs of internal damage. Replace immediately.
- Sudden voltage drop under load — likely a faulty cell. Replace battery.

6. Solar Panels

Solar panels provide charge to the batteries and supplemental power to the system. Verify panel condition and output before replacing any other component.

Visual Inspection

- Check for cracks, visible damage, or discoloration on the panel surface.
- Ensure no shadows or obstructions are blocking the panels — partial shading will significantly reduce output.
- Confirm the panel is facing south (in the northern hemisphere) and tilted to the optimal angle where applicable.
- Check all wiring connections for looseness, corrosion, or oxidation.

Voltage Testing

SYSTEM VOLTAGE	EXPECTED OPEN CIRCUITY VOLTAGE (FULL SUNLIGHT)
12 V system	Above 20 V — refer to open circuit voltage on panel label
24 V system	Above 40 V — refer to open circuit voltage on panel label

Always check the open circuit voltage printed on the solar panel label and compare it against your measured reading under direct sunlight.

7. Sirius MPPT Charge Controller

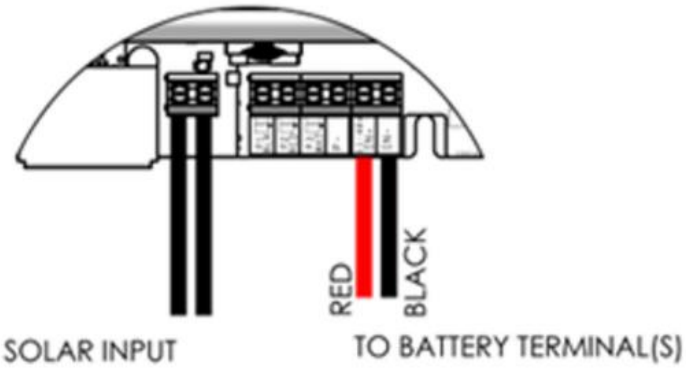
Controller Configuration

To configure the Fusion2™ Controller for the MPPT charge controller expansion board, follow the setup menu path below:

Setup → System → Power and Charging

STEP	ACTION
1	Set the battery type to 'Glass Mat, AGM' or the corresponding battery type if using non-standard batteries.
2	Set the Battery Bank Capacity to match the installed battery bank size.
3	Set the PWR Module Type to 'Charge Controller' to enable the MPPT charge controller.

Once configured, use the Diagnostics screen on the Fusion2™ Controller to verify charge controller values and confirm settings are correct.



8. SunSaver Charge Controller

The SunSaver charge controller has built-in LED indicators that display charging status, battery charge level, and fault conditions. LED sequences vary by fault type — refer to the SunSaver documentation for the specific flash pattern codes.

⚠ Important: Do not use the Load terminals on the SunSaver when connecting to a Sirius system. Using the Load terminals may damage the Sirius controller.

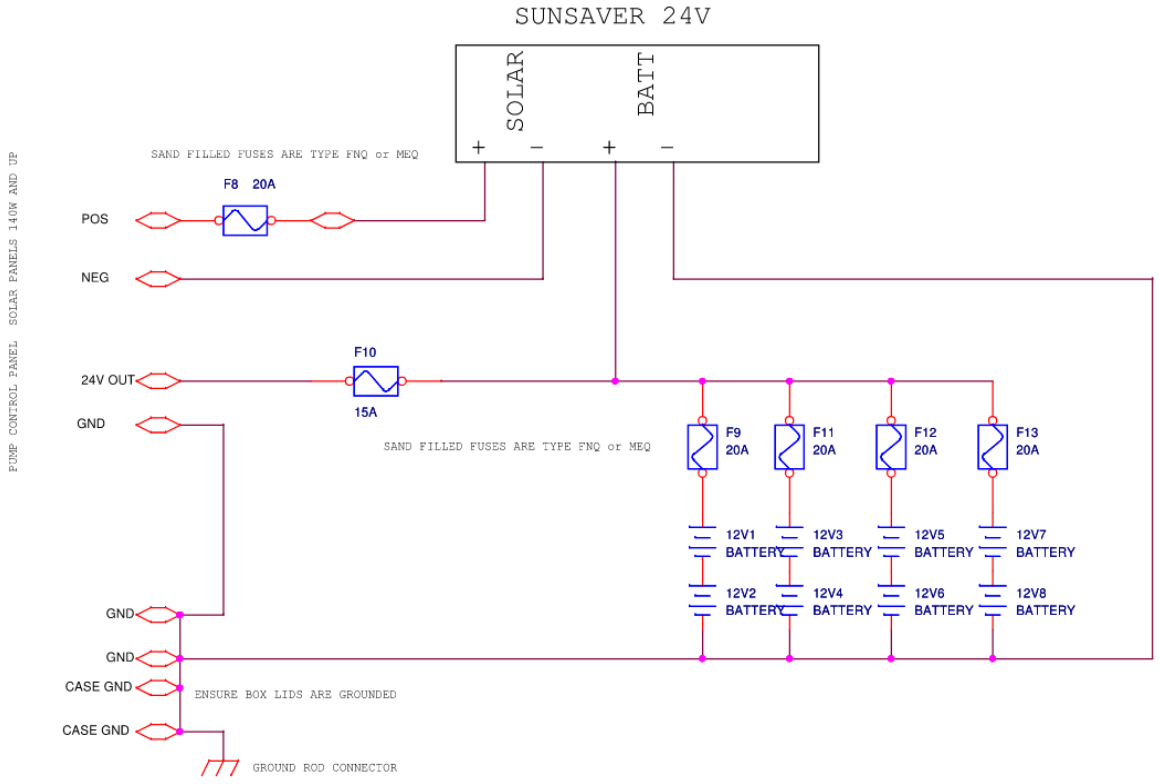
SunSaver LED Status Reference

STATUS LED		
Color	**Indication**	**Operating State**
None ○	OFF (with heartbeat[1])	Night
Green ●	ON Solid (with heartbeat[2])	Charging
Red ●	Flashing	Error
Red ●	ON Solid (with heartbeat[2])	Critical Error

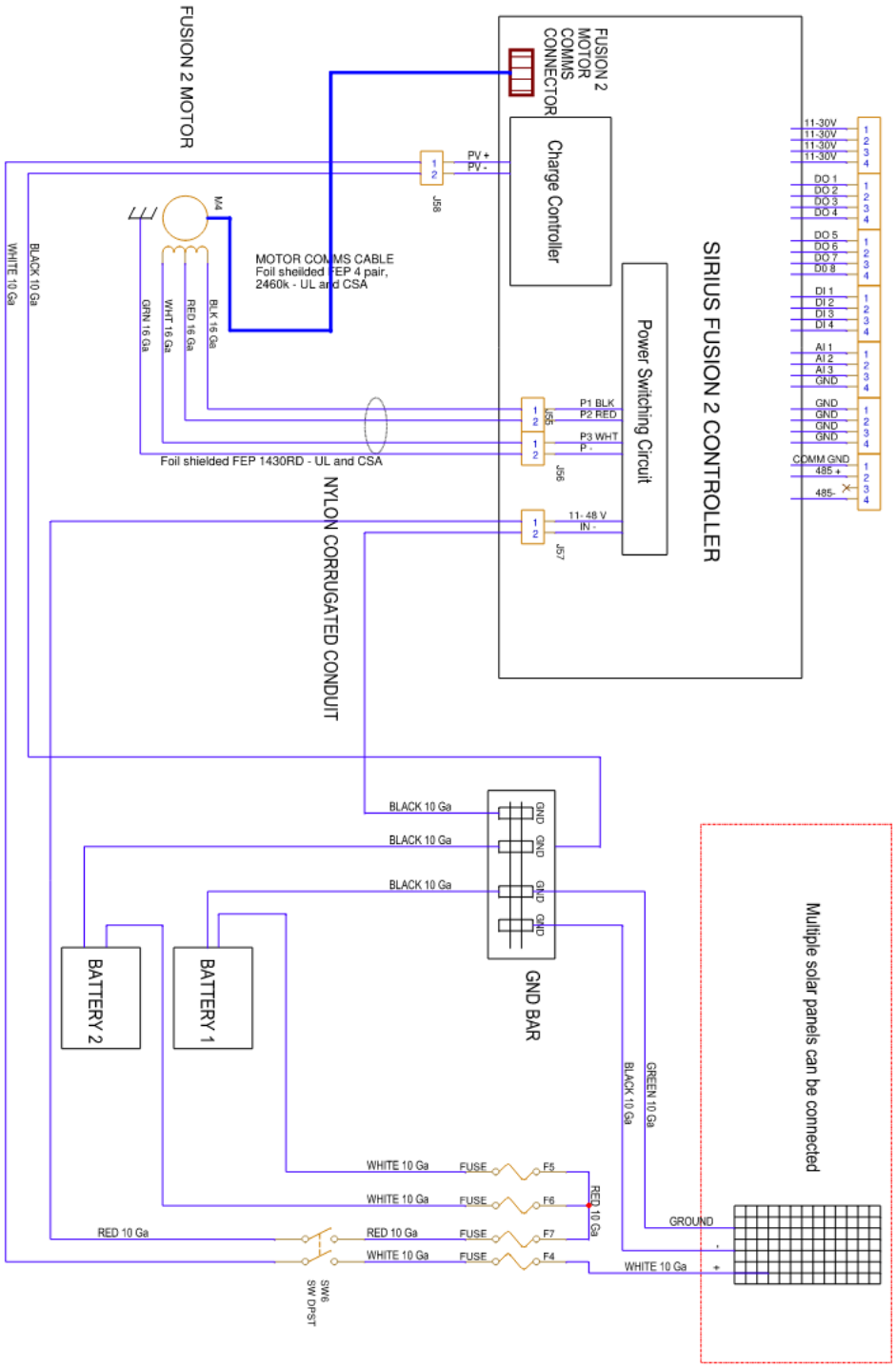
[1] heartbeat indication flickers the Status LED **ON** briefly every 5 seconds
[2] heartbeat indication flickers the Status LED **OFF** briefly every 5 seconds

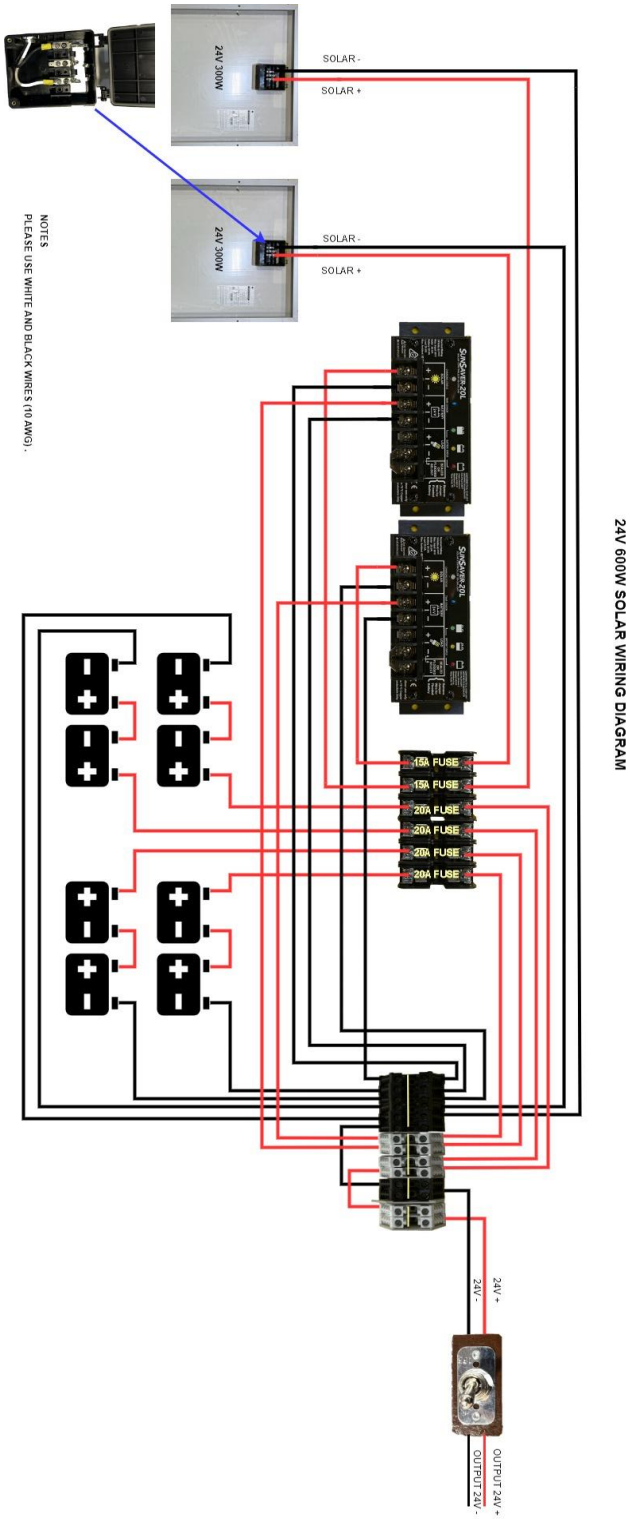
BATTERY STATE-OF-CHARGE (SOC) LED			
SOC LED	**Indication**	**Battery Status**	**Load Status**
Green ●	Fast Flashing (2 Flash / sec)	Equalize Charge	Load ON
Green ●	Medium Flashing (1 Flash / sec)	Absorption Charge	Load ON
Green ●	Slow Flashing (1 Flash / 2 sec)	Float Charge	Load ON
Green ●	ON Solid	Nearly Full	Load ON
Yellow ●	ON Solid	Half Full	Load ON
Red ●	Flashing (1 Flash / sec)	Battery Low	LVD Warning (Load ON)
Red ●	ON Solid	Battery Empty	LVD (Load OFF)
None ○	No LEDs ON	Battery Missing	Load OFF

For a 24V system, refer to the SunSaver documentation for the specific wiring diagram. Fuse sizes and connection points differ between 12V and 24V configurations.



System Wiring Examples




24V 300W
SOLAR -
SOLAR +
24V 300W
SOLAR -
SOLAR +
NOTES
PLEASE USE WHITE AND BLACK WIRES (10 AWG).
15A FUSE
15A FUSE
20A FUSE
20A FUSE
20A FUSE
20A FUSE
24V +
24V -
OUTPUT 24V +
OUTPUT 24V -
24V 600W SOLAR WIRING DIAGRAM

9. Escalation

If all steps in this guide have been completed and the issue remains unresolved, contact the Sirius Technical Support team for further assistance.

Toll-Free	1-866-436-6301
Technical Support	technicalsupport@siriuscontrols.com
Website	www.siriuscontrols.com