

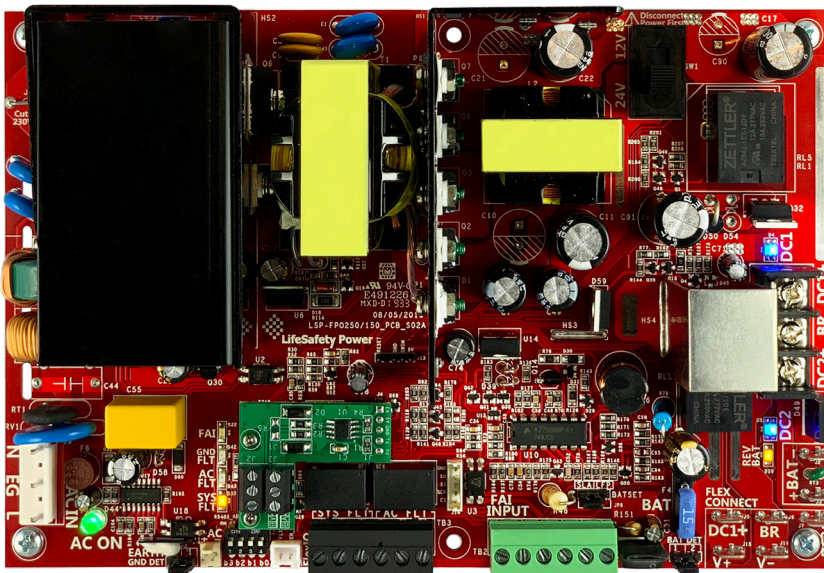
OVERVIEW

Troubleshooting fault conditions in a power supply system can sometimes be difficult. While covering every possible cause of a system fault is impossible, this application note will cover the most common causes and how to fix them.

WHAT IS A SYSTEM FAULT?

For the FPO series of power supplies, a system fault can cover a variety of conditions related to the DC side of the power supply. AC input faults are not included in the system fault and are exclusively shown on the AC fault LED and relay output. Many times an AC fault will also cause a System Fault as the battery drains or due to other conditions.

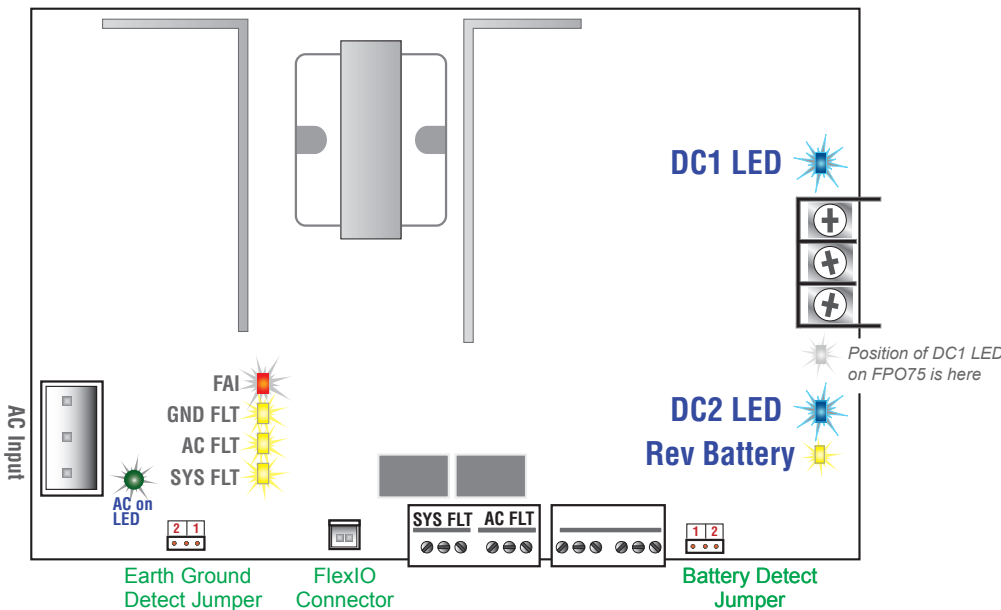
Note: Always clear any existing AC fault conditions before trying to troubleshoot a System Fault.



FPO Gen 1



FPO Gen 2



TROUBLESHOOTING ORDER

For the most efficient troubleshooting, some potential fault causes should be checked before others. Items should generally be verified in the following order.

Note: If multiple FPO power supply boards are mounted within the same enclosure, the boards are linked by the FlexIO cable. This means that if one FPO develops a system fault, the system fault will also appear on the other FPO as well. To isolate the boards, remove the FlexIO cable from both FPO boards to isolate where the system fault is being generated. If the system fault goes away on both FPO boards when the FlexIO cables are removed, the fault is likely coming from an accessory board. See Accessory Fault section below.

Note: If multiple fault conditions are present, fixing one fault condition will not clear the system fault from the FPO.

AC Fault



An AC fault by itself won't cause a System Fault directly, but can have an indirect effect on the system fault status through discharged batteries, missing voltages from other power supplies, etc. If an AC fault exists on any power supply board within the enclosure, correct this before moving on.

FPO Output Fault



If the output voltage of the FPO is not present, a system fault will be generated. First, locate the DC1 LED near the DC output screw terminals on the edge of the board. If the DC1 LED is not lit, the power supply does not have a DC output. If the DC1 LED is lit, verify the output voltage at the DC1 terminals with a voltmeter to ensure the proper voltage is present.

- 12V Setting - 12.5VDC \pm 10%
- 24V Setting - 25.0VDC \pm 10%

If the voltage is missing or incorrect, isolate the power supply and power cycle, as follows:

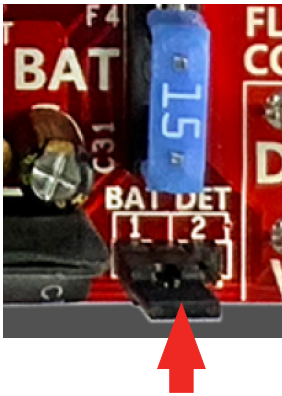
- Remove AC and battery power from the FPO power supply
- Check the DC1 fuse (on green Gen 1 FPO boards only). If the DC1 fuse is ruptured, replace the fuse with the same type and rating. Gen2 FPO boards use electronic limiting and do not have a DC1 fuse.
- Disconnect the DC1 and DC2 faston cables out to any accessory boards, if present
- Disconnect the V+ faston and SPI cables to the NetLink, if present
- Disconnect any wiring from the DC1 and DC2 screw terminals
- Disconnect the FlexIO cable from the FPO
- Reapply DC power
- Measure the DC output voltage at the DC1 terminals

If the DC output is present when isolated, there is a problem in the field wiring or possibly with an accessory board. Isolate each connection to the FPO and accessory boards one at a time to find the problem.

If the DC output is still missing or incorrect, the FPO power supply board may be faulty - contact LSP technical support for further assistance.



Battery Fault



Disabling battery presence detection can be used to rule out connection issues with the battery or a bad/discharged battery set. If the system fault goes away when BAT DET is in position 2 but a charged, known good battery is connected, there is likely a problem somewhere in the battery wiring.

New Installations - As a default, the FPO power supplies come from the factory with battery presence detection ENABLED. That means if you apply AC power to the system and don't have a battery connected, a system fault will be present. To clear this fault, either connect a good battery (of the proper voltage) to the FPO, or disable battery presence detection by moving the BAT DET jumper to position 2.

Note: A new battery is not necessarily charged or even good. Try swapping to a known good, charged battery if battery problems persist.

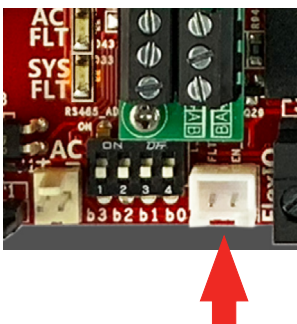
Earth Ground Fault



An Earth fault is easy to identify as the cause of a system fault, as the "Earth Ground" fault LED will also be lit. Earth Ground fault does not indicate a problem with the earth ground connection at the AC input of the FPO power supply.

Earth Ground fault indicates that there is a full or partial connection of earth ground to a positive or negative anywhere in the system. Troubleshooting Earth Ground faults is beyond the scope of this application note - please see AN32 for details on troubleshooting Earth Ground faults.

Accessory Board Fault



Some LSP accessory boards such as the B100, C4, C8, and M8 detect their own fault conditions, such as a blown fuse, incorrect jumper setting, or an overcurrent condition. These faults are transmitted from the accessory to the FPO power supply through the FlexIO cable.

First, check all accessory boards within the enclosure for an illuminated yellow fault LED. If an accessory board has a fault LED lit, see that board's manual for information on fault causes and correct the fault. If no other yellow LEDs are lit, disconnect the white FlexIO cable from the FPO board to isolate the FPO from all other boards in the enclosure. If the fault LED goes out with FlexIO disconnected, check the accessories and other FPO power supplies within the enclosure for problems such as missing power, etc.

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Other Faults, Notes, and Tips



In addition to the fault causes listed above, other problems could cause a system fault. Below is a list of some other potential causes and other helpful tips for troubleshooting FPO system faults.

- Switching the output voltage setting with power applied will cause a system fault and could damage the FPO. Power cycle the FPO to clear the fault.
- Output voltage out of tolerance. If the DC output is higher or lower than the setting, a system fault could be generated. Remove all output wiring and recheck to ensure voltage is not being fed back from another device or the field wiring.
- If the fault is being generated from an M8 managed output board, log into the NetLink and check the M8 board output settings. If one or more outputs have a programmable limit set incorrectly, this could cause a system fault. See the M8 manual for information on programming limits.
- If an output LED on a C4, C8, or M8 is OFF, the fuse or PTC for that zone has likely opened due to an overcurrent. Remove the field wiring from that zone and replace the fuse or wait for the PTC to cool. If the field wiring is OK, verify the jumper settings for the zone.
- Power cycling the FPO board can sometimes clear a fault condition that has latched on. Remove AC and battery power and wait for all LEDs to extinguish before reapplying power.
- If all other troubleshooting fails, contact LSP Technical Support for assistance - there could be another issue or the FPO could be faulty.

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