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## What is a Limited Power Source?

There are many technical details regarding Limited Power Sources (often referred to as an LPS) covered in the IEC60950-1 safety standard, involving a variety of applications, but I will cover just the basic aspects regarding AC-DC power supplies in this blog article.

Several safety standards refer to IEC60950-1 for a wide range of applications, and one of those referrals involves the use of Limited Power Sources.

What is, and why are Limited Power Sources important? Simply put, if a piece of electrical or electronic equipment supplying DC power to external devices is to be installed by a third party, such as an electrician, the risk of wiring fires & electrical shock needs to be minimized. That electrician will not be expected to know all the potential fault scenarios and use the appropriate cable thicknesses and insulation to cover those hazards. By using a Limited Power Source, the system wiring can also be reduced, saving cost.

If a Limited Power Source is used, then the electrician's job is simplified, even if there is a (single) fault inside of the power supply.

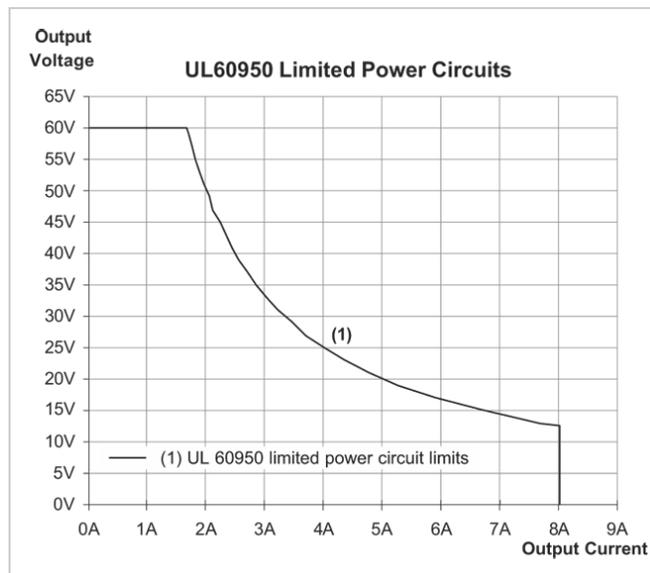
Some examples of testing that the power supply manufacturer will do, to determine the maximum output current and power meet the "Limited Power Source" requirements are:

1. Check the power supply at maximum rated load
2. Increase the load of the power supply until it is on the verge of overload
3. Simulate an internal fault by shorting the current-limiting resistor
4. Short out the opto-coupler that provides feedback to the control loop

The conditions for a "Limited Power Source" AC-DC power supply are:

1. For a power supply rated at 30V or less, the following must be met even with a single fault condition:
  - a. The output current must not exceed 8A
  - b. The output power must not exceed 100W
2. For a power supply rated above 30V, but not exceeding 60V:
  - a. The output current must not exceed  $150 \div V_{out}$
  - b. The output power must not exceed 100W

This graph shows the limits for Limited Power Sources:



Taking some examples from TDK-Lambda's **DSP series** of low profile DIN rail power supplies:

The **DSP60-5** is rated at 5V 7A – That would meet (1b), but when put into overload it would certainly not meet the (1a) limit of 8A. This model is not listed as being a Limited Power Source.

The **DSP60-12** is rated at 12V 4.5A – Overload current would be around 7A which meets (1a) and the maximum power is  $\sim 84\text{W}$  ( $12\text{V} \times 7\text{A}$ ) which also meets (1b). This model is listed as being a Limited Power Source.

The **DSP100-24** is rated at 24V 4.2A – Right out of gate this unit exceeds 100W, and so it is not listed as a Limited Power Source.

The **DSP100-24/C2** is rated at 24V 3.8A – This model actually has a special current limit & over power circuit which strictly limits the output current and power under a fault condition, so it meets the  $<8\text{A}$  requirement of (b) and the limit of  $<100\text{W}$ . Interestingly though, a single fault on the control circuit made the output rise to 30.8V and so it now falls under the 30-60V limit of  $150 \div V_{\text{out}} = 4.8\text{A}$  maximum current (2b), which it passed. Therefore, this model is listed as a Limited Power Source.



Test results performed by the safety bodies, such as UL, CSA or TUV, are normally found in the CB report for the power supply.

Posted by [Power Guy](#)