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## Can I Operate my AC-DC Power Supply with a DC Input?

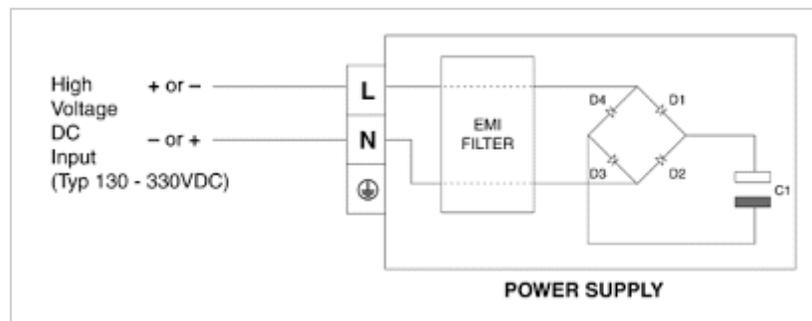
**The answer is yes, sometimes.**

Many standard AC-DC switch mode power supplies (most of Lambda's products) specify a high voltage DC input range in addition to the more common AC input range of 90-264VAC. We receive many questions about how and where to connect the DC input to an AC-DC supply that is spec'd to operate off of DC as well as an AC inputs.

Where and why is high voltage DC power used? It turns out that many power generation facilities provide a high voltage DC to power the plant's equipment rather than the regular 115VAC or 208VAC power grid. This high voltage DC (typically 120 or 130-330VDC) can be easily used with batteries to provide a secure source of power rather than using expensive centralized or local UPS systems.

Now back to the subject. The topology of many switch-mode power supplies actually lends itself to operation from either AC or DC input. Important Note: Always check your power supply's Operations Manual or spec sheet to confirm that it is designed to operate from either an AC or DC input.

Referring to the simplified power supply schematic below:



When powered by an AC sine wave, during the first half cycle the current flows from the Line terminal through the input filter and charges capacitor C1 through diodes D1 and D3. During the second (negative) cycle, current flows from the Neutral terminal and capacitor C1 is charged through diodes D2 and D4.

When powered from a high voltage DC source, the polarity of the connection is not critical as far as the operation of the power supply is concerned. If the positive connection is made to the Line terminal, C1 is charged through diodes D1 and D3. If the positive connection is made to the Neutral terminal, then C1 is charged through diodes D2 and D4.

An important note of caution to insert here is about the protective fusing of the power supply. Internally most power supplies have a fast acting AC rated fuse in series with the Line terminal. It is recommended that a DC rated fuse be installed external to the power supply. If one side of the high voltage DC buss is connected to ground, then the fuse is usually positioned in series with the "hot" side (the ungrounded side). It is recommended that you consult with your local safety engineer to be sure.

Posted by [Power Guy](#)