

# Transformerless Power Supply

## Web-masters Note:

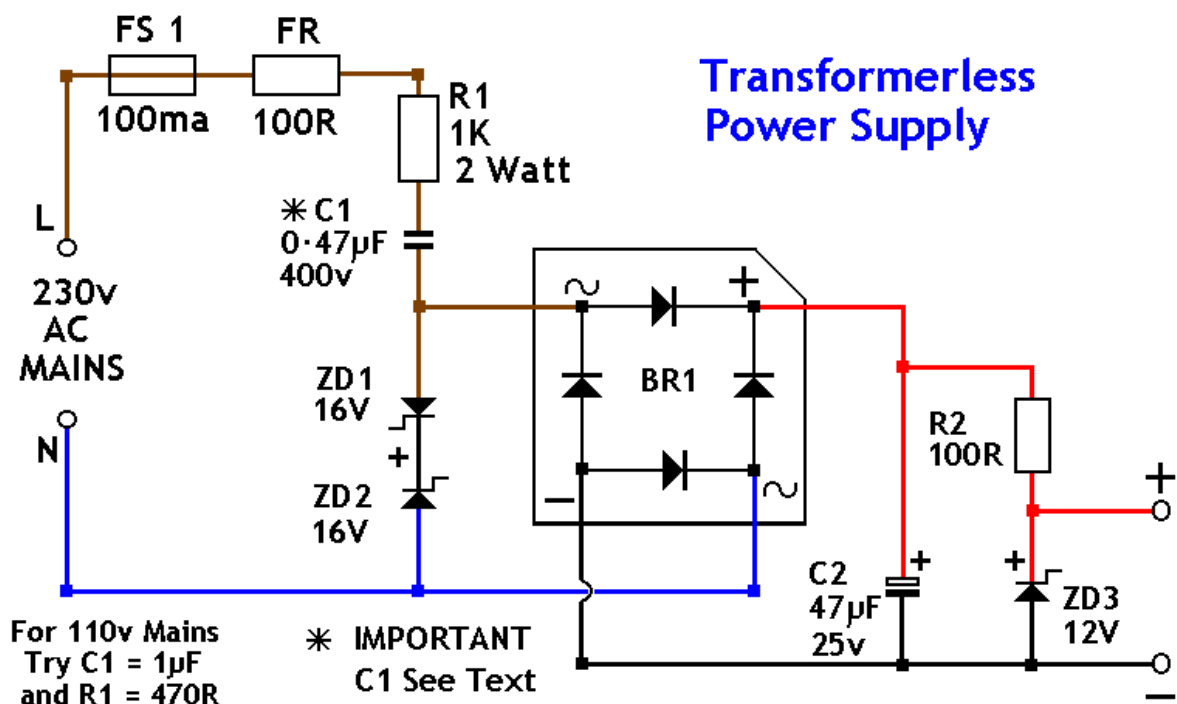
I have had several requests for a power supply project without using a power supply. This can save the expense of buying a transformer, but presents potentially lethal voltages at the output terminals. Under no circumstances should a beginner attempt to build such a project. Please also read the [Disclaimer](#) on this site.

## Important Notice:

**Electric Shock Hazard. In the UK, the neutral wire is connected to earth at the power station. If you touch the "Live" wire, then depending on how well earthed you are, you form a conductive path between Live and Neutral. DO NOT TOUCH the output of this power supply. Whilst the output of this circuit sits innocently at 12V with respect to (wrt) the other terminal, it is also 12V above earth potential. Should a component fail then either terminal will become a potential shock hazard.**

Below is a project by Ron J, please heed the caution above and Ron's design notes.

MAINS ELECTRICITY IS VERY DANGEROUS.



If you are not experienced in dealing with it, then leave this project alone. Although Mains equipment can itself consume a lot of current, the circuits we build to control it, usually only require a few milliamps. Yet the low voltage power supply is frequently the largest part of the construction and a sizeable portion of the cost.

This circuit will supply up to about 20ma at 12 volts. It uses capacitive reactance instead of resistance; and it doesn't generate very much heat. The circuit draws about 30ma AC. Always use a fuse and/or a fusible resistor to be on the safe side. The values given are only a guide. There should be more than enough power available for timers, light operated switches, temperature controllers etc, provided that you use an optical isolator as your circuit's output device. (E.g. MOC 3010/3020) If a relay is unavoidable, use one with a mains voltage coil and switch the coil using the optical isolator. C1 should be of the 'suppressor type'; made to be connected directly across the incoming Mains Supply. They are generally covered with the logos of several different Safety Standards Authorities. If you need more current, use a larger value capacitor; or put two in parallel; but be careful of what you are doing to the Watts. The low voltage 'AC' is supplied by ZD1 and ZD2. The bridge rectifier can be any of the small 'Round', 'In-line', or 'DIL' types; or you could use four separate diodes. If you want to, you can replace R2 and ZD3 with a 78 Series regulator. The full sized ones will work; but if space is tight, there are some small 100ma versions available in TO 92 type cases. They look like a BC 547. It is also worth noting that many small circuits will work with an unregulated supply. You can, of course, alter any or all of the Zenner diodes in order to produce a different output voltage. As for the mains voltage, the suggestion regarding the 110v version is just that, a suggestion. I haven't built it, so be prepared to experiment a little.

I get a lot of emails asking if this power supply can be modified to provide currents of anything up to 50 amps. It cannot. The circuit was designed to provide a cheap compact power supply for Cmos logic circuits that require only a few milliamps. The logic circuits were then used to control mains equipment (fans, lights, heaters etc.) through an optically isolated triac. If more than 20mA is required it is possible to increase C1 to 0.68uF or 1uF and thus obtain a current of up to about 40mA. But 'suppressor type' capacitors are relatively big and more expensive than regular capacitors; and increasing the current means that higher wattage resistors and zener diodes are required. If you try to produce more than about 40mA the circuit will no longer be cheap and compact, and it simply makes more sense to use a transformer.  
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