

Efficiency of Converters

WARNING: DC power can be dangerous. DO NOT TOUCH LIVE CIRCUITRY.

Abstract: In this lab, the electrical efficiency of a DC converter will be found to show to importance of proper DC electrical converters.

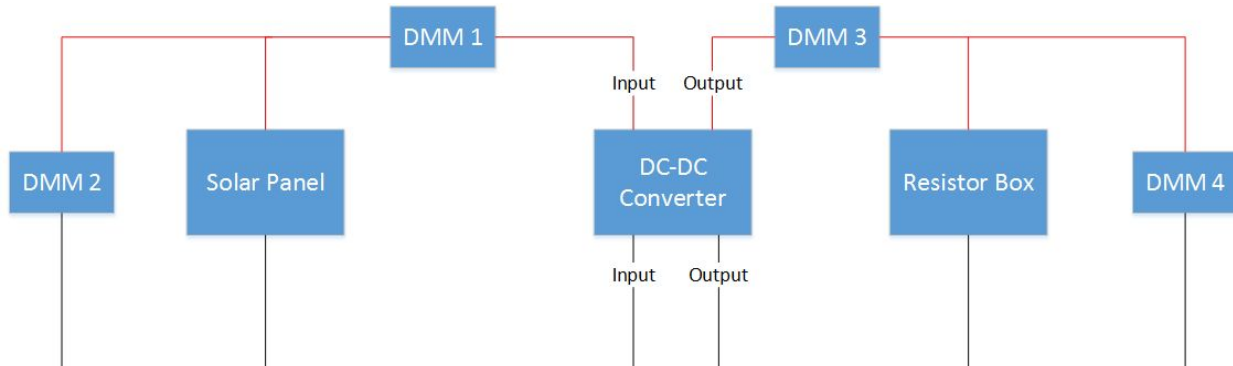
Materials:

- Solar Panel Cluster
- Banana Jack wires
- 4 Digital Multimeters (DMM)
- Work Light
- Wooden board with DC power regulator

Procedure:

1. Place the light fixture approximately 1 foot away from the solar panel, with the light fixture OFF.
2. Insert the red wire from the 10 A Max terminal of the first DMM to the red terminal on the solar panel.
3. Insert another red wire from the COM port of the first DMM to the red input power regulator terminal.
4. Turn the first DMM dial to 10A position on the multimeter.
5. Insert the black wire from the black input power regulator black terminal to the black terminal on the solar panel.
6. Connect a black banana jack wire from the COM port on the second DMM to the black terminal on the solar panel.
7. Connect a red banana jack wire from the Voltage port on the second DMM to the red terminal on the solar panel.
8. Turn the second DMM to the 20V DC position.
9. Connect a Red wire to the output terminal of the power regulator and the 10Amax terminal of the third DMM.
10. Connect a Red wire from the COM terminal of the third DMM to the red terminal of the Resistor box.
11. Set the third DMM dial to 10A.
12. Connect a Black wire from the black terminal of the resistor box to the black terminal of the power regulator.
13. Turn the knob of the resistor all the way to the right (clockwise).
14. Connect another red wire to the red terminal of the power regulator to the V Ω mA terminal of the fourth DMM.

15. Connect another black wire to the black terminal of the power regulator to the COM terminal of the fourth DMM.
16. Turn the dial of the fourth DMM to 20V.
17. The circuit created is shown below:



18. Turn the light ON.
19. While turning the knob of the resistor box record the Input Current (DMM 1), Input Voltage (DMM 1), Output Current (DMM 3), Output Voltage (DMM 4) in the calculations section of the laboratory.
20. Turn the light OFF, and disconnect all of the wires.

Calculations:

Input Current	Input Voltage	Output Current	Output Voltage

- Find the power supplied by the solar panel for each measurement. Hint: $P=IV$

- Find the power supplied by the regulated power source for each measurement. Hint: $P=IV$
- Find the efficiency of the power regulator. Hint: $\frac{Power}{P_{panel}} * 100$

Analysis:

1. How did the power generated by the solar panel change as you turned the resistor box?
2. In the laboratory what percentage of the energy the solar panel produced was lost in the power converter?