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What size and type of output wires should I use?

There are two main considerations for sizing DC wiring from the output of a power supply to its load. They are ampacity (fancy term for the number of Amps) and voltage-drop (remember ohms law: V = I x R). Ampacity refers to a safe current carrying level as specified by safety organizations such as Underwriters Laboratories and the National Fire Prevention Association, which publishes the National Electric Code (NEC).

AWG stands for American Wire Gauge and defines the diameter and cross sectional area of the wire. The smaller the AWG number, the larger the diameter, cross-sectional area, and current carrying capacity of the wire. Always use insulated wires with solid or stranded pure copper conductors (do not use aluminum or copper-clad steel wires). The voltage-drop is simply the amount of voltage lost in a length of wire due to the resistance of the conductor.

DC wires may be sized for either ampacity or voltage drop depending on the wire length and conductor heating. In general, ampacity considerations will drive wire selection for short wire lengths (less than 50 feet) and voltage drop will drive wire selection for longer lengths (greater than 50 feet). **Note**: If you are using the Remote Sense feature of the power supply, remember to stay within the maximum voltage drop across the cables that the Remote Sense is designed to compensate for, which can range from 0.3V to 1.0V (check the power supply's user-manual for details).

The National Electric Code table 310.16 provides ampacity values for various sizes, bundles, and insulation temperature rated wires. ALWAYS FOLLOW THE NEC RULES, LOCAL CODES, AND YOUR COMPANY'S PRACTICES WHEN SELECTING DC WIRING.

Table 1 shows the MINIMUM recommended wire sizes for different load currents. The use of larger diameter wires (with a smaller AWG number) would reduce the voltage drop (and heat generated) across the wires. The current ratings in Table 1 are based upon using 90° C rated insulated wire. If using a lower temperature rated insulated wire (e.g., 60° C), the wire diameter would need to be larger. Refer to the following web site for more information about wire gauges: http://en.wikipedia.org/wiki/American_wire_gauge .

For example, per Table 1 below, a load current of 200 Amps would require a minimum of two # 2 AWG wires connected in parallel for each of the output connections (one pair or wires for the positive (+) and one pair for negative (-) output connections to the load). Again, larger diameter wires would decrease the voltage drops across these wires.

Minimum Recommended DC AWG for 90°C Cabling for Protected Outputs

Total Power Module Current Rating (A)	Wire & Lug Gauge (AWG) using 90°C wire (NEC Table 310.16)
5	18
10	16
15	16
20	14
30	12
40	10
50	8
75	6
100	2
125	2
150	(1) 1 AWG or (2) 6 AWG
175	(2) 4 AWG
200	(2) 2 AWG
225	(2) 2 AWG
250	(2) 2 AWG
300	(2) 1 AWG

Table 1

Posted by Power Guy