

Friday, September 9, 2011

Using Power Supplies with DC Motors

There is often confusion regarding the use of external diodes when power supplies are used to power DC motors. Most people know that a diode has to be used, but are unsure where to place them or what their purpose is.

From a power supply concern there are two types of DC motors; a brushed DC motor and a brushless DC motor.

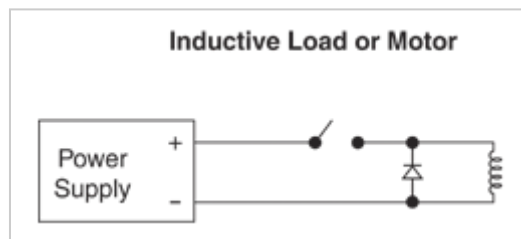
Brushed DC motors

With this type of motor, the magnets are stationary and the coil spins. Electricity is transferred to the spinning coil by the use of "brushes".

The advantages of this type of motor are low initial cost and easy speed control.

When the power is interrupted, the motor coil will act like an inductor and will try to continue to produce current, effectively becoming an inverted voltage source. This will apply a reverse polarity to the power supply and can cause damage. (Back EMF – Electro-Magnetic Flux)

By using a diode, as shown below, the diode provides a current path for the reverse motor current and will clamp the reverse voltage to a level no greater than the forward voltage drop of the diode. This protects the power supply's output capacitors and other components from being stressed by the reverse voltage.



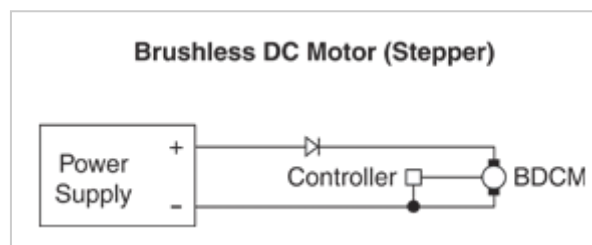
Brushless DC motors

Brushless DC motors, often referred to as BDCMs or BLDC motors, have permanent magnets that rotate and the armature is fixed.

Although more expensive, they are more reliable in the long term as there is no brush or commutator wear and position control is more accurate.

When the motor is turned off or reversed, it will act as a generator and produce a high voltage spike. This spike can cause the power supply's overvoltage protection to trip, shutting down the unit.

By using a diode in series with the output, as shown below, the spike will be blocked from interfering with the power supply.



In both cases a general purpose diode can be used, providing that the voltage and current ratings for the diode are correctly calculated.

Posted by [Power Guy](#)