

The 7-Henry Inductor

One Of Our Readers Wrote To Us:

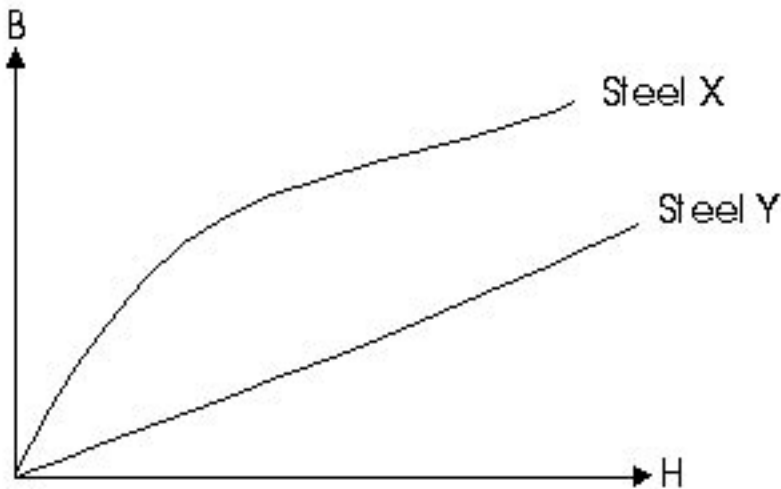
Sir;

I recently purchased a 7 Henry inductor. When the inductor was placed in a circuit operating at 210Hz, it exhibited inductance of about 12 Henry and when placed in a circuit operating at 1KHz, it exhibited inductance of about 8 Henry. I have another inductor that is specified as being 8 Henry. It exhibits this approximate inductance when placed in the same circuit at the above frequencies. Why does one vary so greatly while the other one varies in a much narrower range? Is it due to dissipation factor?

--Don Oldfield

The measured value of a large iron-core inductor can vary from its nominal value for several reasons.

One reason is the magnetic property of the steel in the core of the inductor. The steel is characterized by a graph called a B-H curve (*See Below*).



B represents the magnetic flux while H represents the current in the coil. The inductance is proportional to the slope of the curve. As you can see from the graph above, different steels have different slopes. In the case of steel x, the slope changes as B increases thus causing the inductance to change.

The bottom line is that the measured value of an inductor may depend on the amplitude of the voltage across it. It may also vary with frequency. It will definitely change if there is a DC current in the coil instead of pure AC.

Some inductors are specifically designed to maintain a more-or-less constant value over a range of frequencies and amplitudes. Other inductors are designed to provide a defined minimum value, but the value may vary above that minimum.