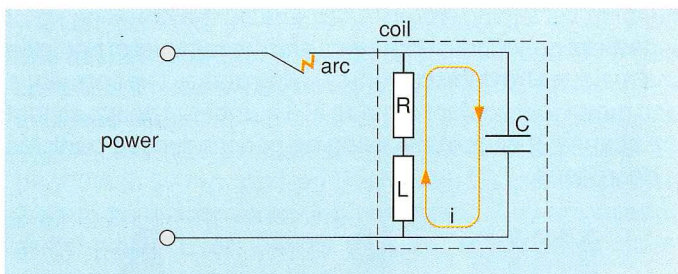


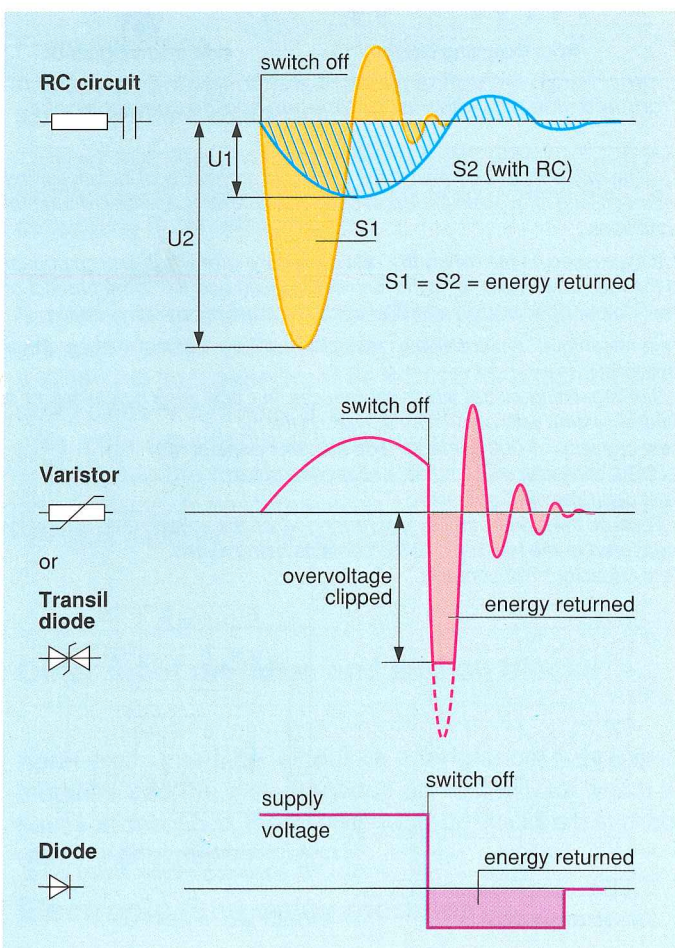
Protection against interference

Each time an inductive load is switched off, for example a contactor coil, an overvoltage appears at its terminals. This overvoltage can reach several thousand volts at its peak and a frequency of several MHz.

This transient phenomenon is caused by the fact that the energy stored in the coil ($\frac{1}{2} LI^2$) is released at the moment the load is switched off. Part of this energy is released in the electrical arc at the control contact. When this arc is extinguished, the energy which remains causes a flow of damped sinusoidal current. The frequency of this current depends on the characteristics of the coil, which acts as an RLC oscillating circuit. The residual energy is dissipated by Joule effect.



Switching an inductive load



Action of the various interference suppression systems

During the opening of the control contact, the high overvoltage causes the air to break down between the fixed and moving contacts, thus re-establishing the mains voltage. This phenomenon is repeated until the stored energy is totally dissipated. It causes high frequency radio-electric emission which is propagated by radiation and by capacitive coupling between the connections.

Interference suppression modules

Interference suppression modules are used to reduce overvoltage when the load is switched off and thus limit the strength of the interference signals to an acceptable level for the surrounding equipment. They generally have little effect on the drop out time of the contactors, except in the case of a diode circuit.

There are three types of interference suppression modules available in the **7** contactor range :

RC circuit

This is used for a.c. electromagnets. The capacitor reduces the natural oscillating frequency of the coil to approximately **150 Hz**, and clips the overvoltage to **3 Un maximum**. The resistor in series with the capacitor limits the current inrush to the capacitor when the control contact closes.

Varistor or Transil diode

The varistor module can be used with a.c. or d.c. electromagnets. A varistor is a component whose resistance decreases according to a non linear ratio as the voltage at its terminals increases. It produces an avalanche effect which enables the overvoltage to be clipped to approximately **2 Un**, but does not change the natural oscillating frequency of the coil.

The Transil bidirectional diode is a semiconductor which has the same characteristics as two head to tail Zener diodes. It has the advantage over a varistor that its characteristics do not change over time.

Diode

Often called "freewheel diode", this module can only be used with d.c. electromagnets. Correct polarity must be maintained. At switch-off, the stored energy tends to cause current flow in the same direction as before switch-off. The diode allows this flow, and, due to its low conduction threshold ($< 1 V$), it avoids any overvoltage at the coil terminals.



Interference suppression modules