

Electrical Interference from HVAC Relays

Most relays used in HVAC machines allow low voltage 24Vac circuits to control high voltage, high current devices like motors and electric heating elements. These relays need special attention so they do not interfere with electronic devices inside or near the HVAC machine.

When the controls connect 24Vac to the relay coil, current flows through the coil windings creating a magnetic field that pulls the relay contacts closed. This field is held in place by the connected 24Vac. When the controls disconnect the 24Vac from the relay coil, the magnetic field is no longer held in place and ceases to hold the relay contact place.

Where did the magnetic field go? The magnetic field is stored energy. When the field collapsed, the energy had to go somewhere. The energy is induced into the coil and returns to electrical energy, the form of origin.

When the energy was stored, the coil was connected to 24Vac. But now, the coil is not connected. The energy cannot stay stored in the coil, so it reaches a potential high enough to dissipate the energy. This is the same principal that fires automotive spark plugs!

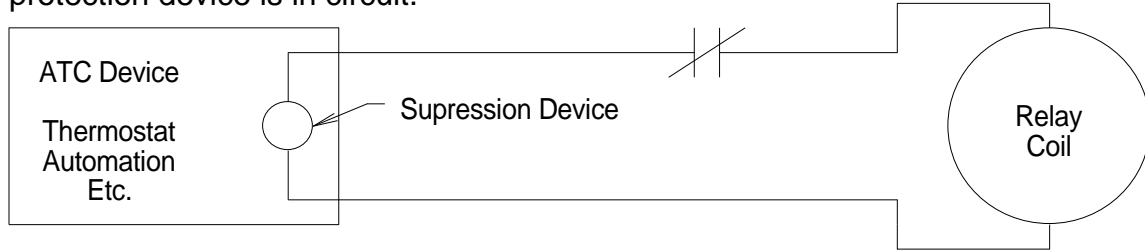
High speed spikes approaching 60 kV have been observed! This high potential can crate arcing, put high speed high voltage pulses on the control wiring, or dissipate as RF interference.

The high voltage pulses can interfere with modern electronic devices within the HVAC machine, and external devices, too. Because the interposing contacts are often safeties, the interference may be random and infrequent. The result is random and infrequent failure of the affected devices. Cycling power to the failed devices usually restores proper operation.

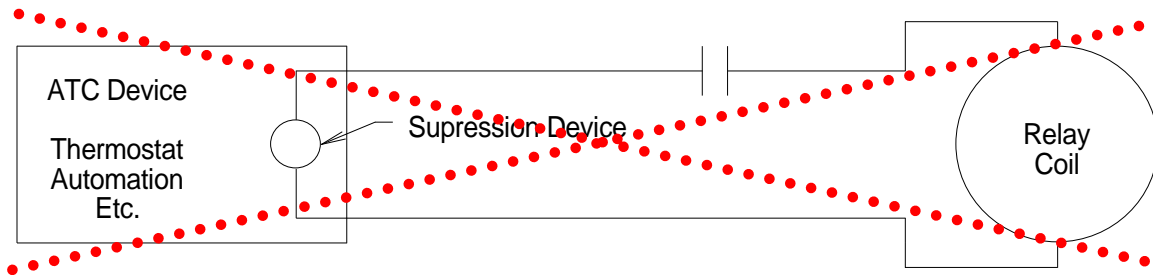
When modern electronic controls drive relays, they include a device that allows the relay to dissipate this energy at a low voltage. The device is in circuit across the wiring terminals where the relay is connected. When the potential across the device exceeds a voltage of about (+ or -) 85 Volts, the device allows current to flow from the coil and through the device. The energy dissipates as heat, and never reaches the potentials that cause interference.



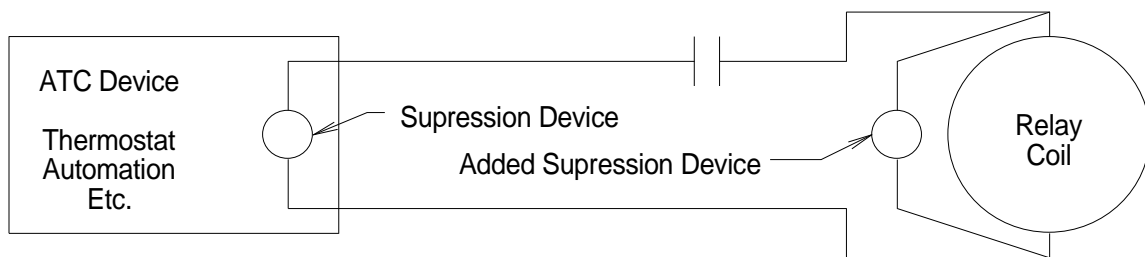
Many HVAC machines connect contacts from safety and other control devices in the circuit between the relay and the electronic controls. When all interposing contacts are closed, the control device is connected to the relay coil and the protection device is in circuit.



When any of the interposing contacts open, the protection device is not in the circuit. In these applications, other means to eliminate interference may be required.



A 70 Volt suppression device connected across the relay coil will suppress the interference.



Suppression Device;
Panasonic ERZ-V05D820
Digi-Key part number P7187-ND

<http://www.digikey.com/>