Technical Bulletin

Coil Suppression TB 1001

There are many instances where it is necessary to connect electromechanical devices such as relays or solenoids to the fire detection system.

Such devices, unless properly suppressed, can wreak havoc upon the increasingly complex and sensitive control equipment demanded by today's standards.

The problem is caused by a phenomenon called "Back Electro Motive Force" or Back EMF.
A relay or solenoid is operated by an electromagnet, which is a coil of copper wire wound around an iron core. When current is passed through the coil, the iron core becomes magnetised and operates an armature thus closing the contacts (relay) or pushing/pulling a pin (solenoid).

This is fine providing that the current consumption of the coil does not exceed the sourcing capability of the control equipment power output.
The current consumption in DC systems can be calculated as the supply voltage (typically 28 Volts for fire systems) divided by the resistance of the coil (typically 650 Ohms for a heavy duty relay).

Problems can arise however when the voltage is removed from the coil. The magnetic field generated in the iron core collapses and briefly induces a voltage back into the coil of reverse polarity and often many times greater than that originally applied. It is this "Back EMF" which can cause severe damage to sensitive electronic devices in control equipment.

The answer to this potentially catastrophic condition is simple.
Fitting a suitably rated (400V or more) silicon diode across the coil will cause the high voltage to be shorted out by the diode before it can reach the power supply of the system.

This simple procedure should be considered an absolute necessity when using electromechanical devices.

Failure to suppress the transient high voltages may cause damage which is not immediately apparent when commissioning and testing but may manifest itself at a later date.

This latent damage is particularly undesirable in security and life safety systems and must be avoided.

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