PRECAUTIONS IN THE APPLICATION OF REED SWITCHES
TECHNICAL DATA SHEET 1

Many of Kelco Engineering's products use reed switches as the principal switching element. Reed switches offer major advantages over alternate types of switches including very high reliability and long stable life. To obtain their full benefits, reed switches need to be correctly applied. If they are overloaded or misapplied, they can be easily damaged or destroyed.

Reed switches consist of a sealed glass tube filled with an inert gas. Two separate ferromagnetic reeds are arranged within the tube with their tips parallel and very close together, but not quite touching. When a magnet is brought near a reed switch, the two reeds adopt opposite magnetic polarity, and are drawn together, thus closing the switch. The amount of movement of the reeds in the presence of a magnet is very small, and the flexing of the reeds is kept well within the elastic limits of their materials of construction. The result is a switch that potentially has an exceptionally long life. In most reed switches the glass housing is sealed and pressurised with an inert gas. The gas prevents oxidisation of the reeds and increases the break down voltage of the switch.

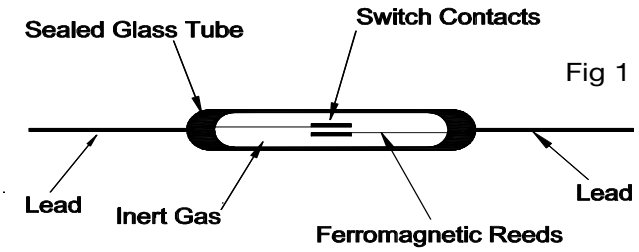

Fig 1

BASIC REED SWITCH LAYOUT

- Reed switches offer an infinitely high resistance when their contacts are open, in other words they give complete galvanic separation of the contacts.
- Very low resistance when the contacts are closed.
- Very high reliability, given they are correctly applied.
- Very low resistance drift over time, as the contacts are not prone to oxidisation, due to the inert atmosphere within the switch.
- They contain no mechanism for the storage of electrical energy, and are therefore excellent as control devices in hazardous applications.

Reed switches are ideal for computer or PLC applications, and for all types of signalling in electronic controllers, timers and telemeter systems. In addition they are suitable for control of small relays and solid-state relays. Reed switches are not suitable for control of inductive loads such as electric motors, (even very small DC motors). They are also not suitable for control of high wattage contactor or solenoid coils unless fitted with suitable arc suppression circuits. Finally they are not suitable for control of incandescent filament lamps unless great care is taken to control the cold filament inrush current that occurs on start-up.

When a reed switch is going to be used as a control device various factors need to be considered. Firstly the nature of the load should be assessed. If the load is slightly inductive (such as a small relay, solenoid or contactor), or if long cable runs are to be used, consideration should be given to employing measures to protect the reed switch. Such measures may include an interposing relay to isolate and protect the reed switch, or the use of shielded cable, or rate effect suppression circuits, or the use of a blocking diode. Mains voltage cabling running alongside unshielded signal cable can result in induced voltages in the signal cable, particularly where long cable runs are involved. In such applications shielded cable should be used.

CONTACT PROTECTION IN DC CIRCUITS

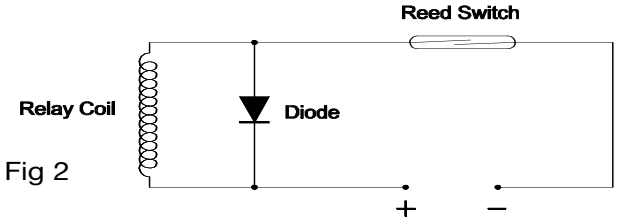

Fig 2

Fig 2 depicts typical reed switch protection in a DC application. In Fig 2, a blocking diode parallel to the inductive load (or parallel to the reed switch) is used to reduce the high reverse voltage present across the contacts when the reed switch opens. The forward breakdown voltage of the diode needs to be larger than the supply voltage, and the forward current rating of the diode should be equal to 5 times the supply voltage divided by the coil resistance, in ohms. Note that a metal oxide varistor (MOV) can be used in a similar manner.

CONTACT PROTECTION IN AC CIRCUITS

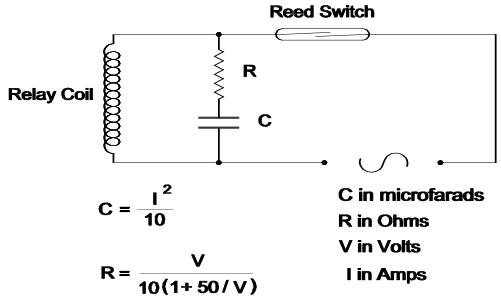

Fig 3

Fig 3 depicts a typical AC application where a series connected resistor and capacitor are placed in parallel with the inductive load. The capacitor serves as an alternate path for the destructive back voltage generated by the collapsing magnetic field within the inductive load; the back EMF is generated each time the reed switch contacts open. The series resistor acts to limit the high inrush current flowing from the capacitor back across the reed switch contacts, each time the reed switch contacts close.

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