

Methods of Operating Reed Switches

Reed switches are operated by a magnetic field creating opposite poles at the contacts. This creates a magneto motive force which draws the contacts together. The magnetic field can be produced by a permanent magnet or induced by an electrical current flowing in a coil. The following diagrams illustrate some of the mechanical and magnetic arrangements that may be used, depending on the application.

Operation using a coil

The coil must produce the magneto-motive force required to operate the switch and hold it closed.

The coil is energised at 1.5 times the operate value.

Figures 1-3 illustrate various methods of operating the switch using a coil.

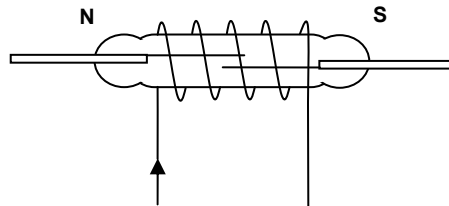


Fig. 1. A dry reed switch mounted within a coil

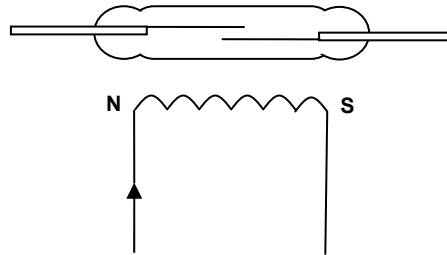


Fig. 2. A dry reed switch mounted outside a coil

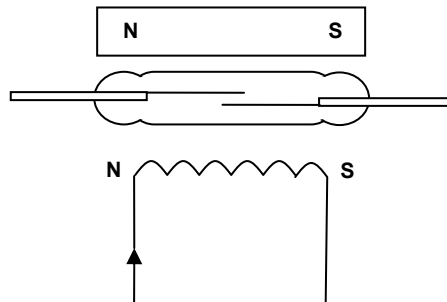


Fig. 3. A dry reed switch biased by a permanent magnet and operated by a coil



Operation using permanent magnets

Various combinations of magnet and the switch positions affect operation. The main methods of operating are illustrated in figures 4 - 10.

Solid lines indicate Pull-In, dashed lines indicate Drop-Out.

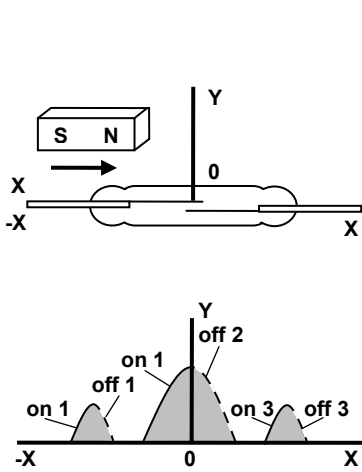


Fig. 4.

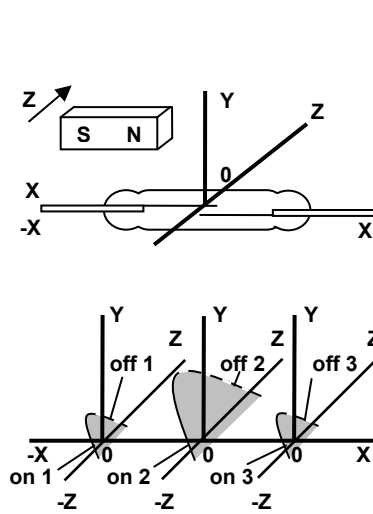


Fig. 5.

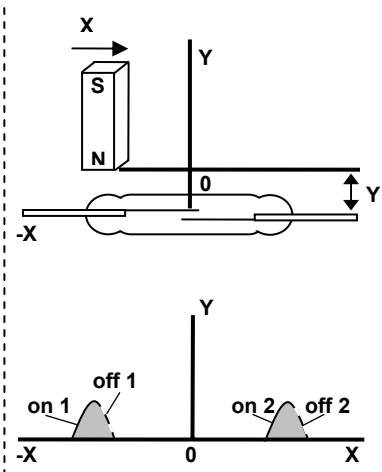


Fig. 6.



Deeter Electronics Ltd follows a policy of continual development of its products and reserves the right to change specifications and/or features without notice

Deeter House, Valley Road, Hughenden Valley, Bucks. HP14 4LW

Tel: +44 (0) 1494 566046 Fax: +44 (0) 1494 563961 Email: sales@deeter.co.uk

www.deeter.co.uk

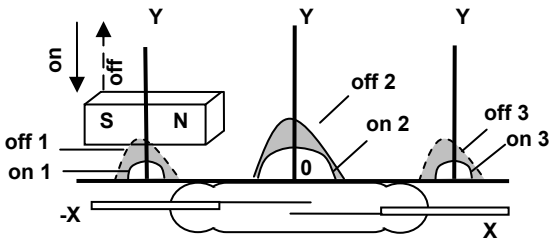


Fig. 7.

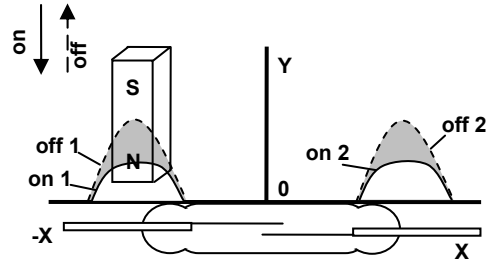


Fig. 8.

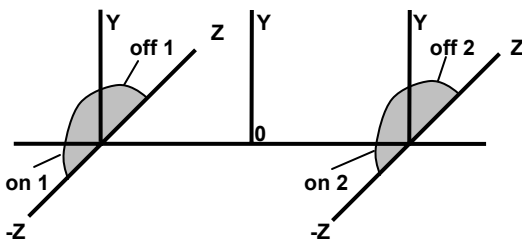
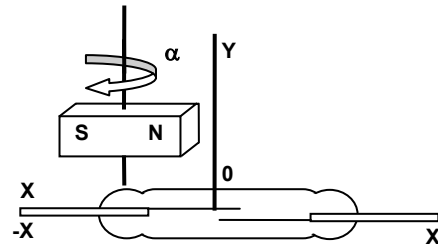
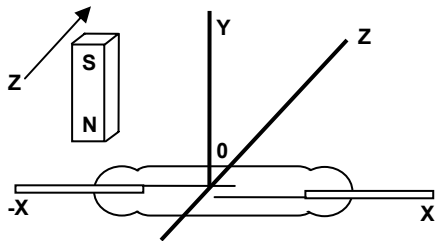


Fig. 9.

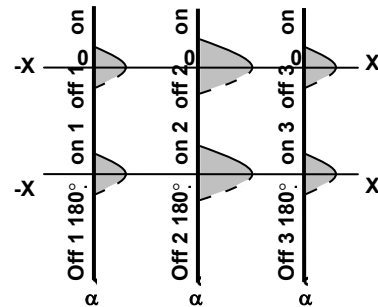


Fig. 10.



Operation Instructions

Ensure that there are no stresses that might break the glass to metal seal or fracture the glass body. Screening from external magnetic fields will limit erroneous operation. When considering the characteristics of the load do not ignore stray inductance and capacitance – keeping load and switch as close together as possible minimizes these effects. In general, the life of the contacts is in the order of 10E8 operations at no-load. As the load increases, the lifetime of the switch decreases. This reduction is due to erosion of the switch contacts. The use of ‘snubbers’, diodes and suppression circuitry is recommended to lengthen contact life.

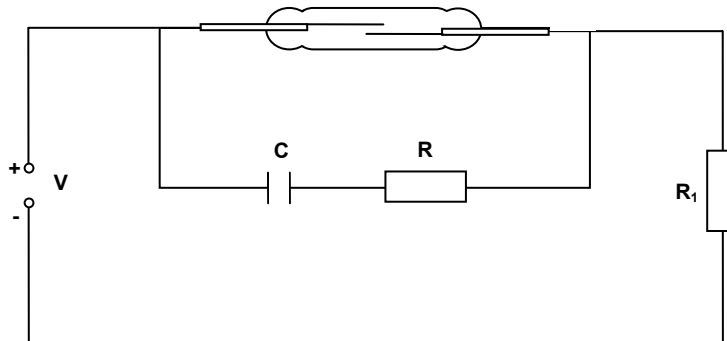


Fig. 11 DC Circuits

To prevent an electrical arc striking the following condition must be fulfilled:

$$Vr = V \frac{R}{R + R_1} \leq 10$$

Where,

Vr – reed blade voltage when the contacts are opened, V;

V – supply voltage, V;

R – resistance value, Ohm;

R_1 – load resistance, Ohm;

Load resistance is calculated by:

$$R \geq \frac{V}{I_{switch \cdot max} - I_1}$$

Where,

$I_{switch \cdot max}$ – maximum switching current, A;

I_1 – load current, A

The capacitance value is expressed by: $C = (0,05 \div 1,0) I_{switch}$

Where,

C – capacitance value, μF

I_{switch} – switching current, A;

When using reed switches for inductive loads the contact protection is carried out with a diode (Fig. 12).



Deeter Electronics Ltd follows a policy of continual development of its products and reserves the right to change specifications and/or features without notice

Deeter House, Valley Road, Hughenden Valley, Bucks. HP14 4LW

Tel: +44 (0) 1494 566046 Fax: +44 (0) 1494 563961 Email: sales@deeter.co.uk

www.deeter.co.uk

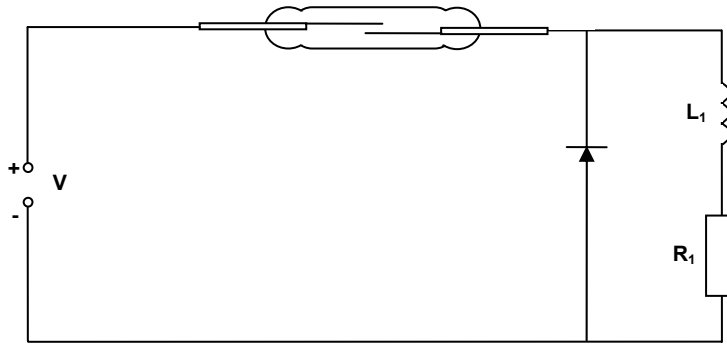


Fig. 12 DC Circuit

The rated current of the diode must not exceed the switching current.
 The reverse rated voltage must not exceed the supply voltage V.

$$I = \frac{L}{R_1}$$

When using the reed switch for capacitive loads contact protection is carried out with a resistor (Figure 13).

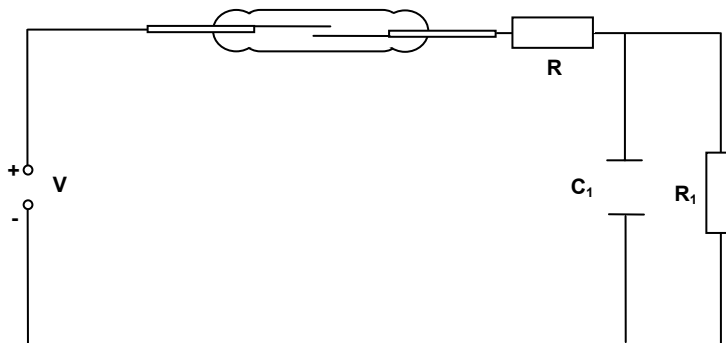


Fig. 13

The resistance value is calculated by:

$$R \geq V / I_{switch.max.}$$

Or

$$R > V^2 / P_{max.}$$

Where,

$I_{max.}$ – maximum switching current;

$P_{max.}$ – maximum contact rating

When using reed switches for lamp loads the contact protection is carried out with a resistor (Figure 14).



Deeter Electronics Ltd follows a policy of continual development of its products and reserves the right to change specifications and/or features without notice

Deeter House, Valley Road, Hughenden Valley, Bucks. HP14 4LW

Tel: +44 (0) 1494 566046 Fax: +44 (0) 1494 563961 Email: sales@deeter.co.uk

www.deeter.co.uk

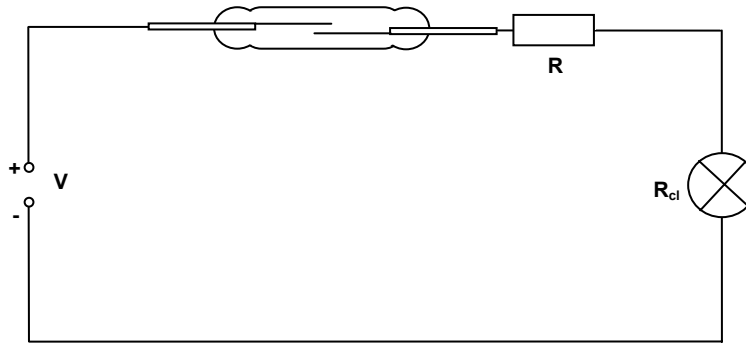


Fig. 14

To reduce the high inrush current to $I_{\text{switch-max}}$ value the following condition must be fulfilled:

$$R + R_{cl} = V / I_{\text{switch-max}}$$

Where,

R_{cl} - the cold lamp resistance which is at 8-14 times less than the hot lamp resistance

R - the resistance value



Deeter Electronics Ltd follows a policy of continual development of its products and reserves the right to change specifications and/or features without notice

Deeter House, Valley Road, Hughenden Valley, Bucks. HP14 4LW

Tel: +44 (0) 1494 566046 Fax: +44 (0) 1494 563961 Email: sales@deeter.co.uk

www.deeter.co.uk

Mounting Instructions

Reed switches can be used both in plug-in and PCB mounting.

When mounting, extreme caution should be exercised not to exert any undue stress that can result in damage to the body or glass-to-metal seal of the reed switch. It is recommended to provide adequate spacing between the reed switches.

When it is necessary to connect more than one wire to the leads, the second and all subsequent wires must be soldered (or welded) to the earlier soldered wire but not to the reed switch lead. The wire section must be equal to the reed lead section.

When welding or soldering reed switches deformation should be minimal. The output power of the soldering iron must not exceed 100W. The time of continuous heating of the leads should not exceed 3 sec.

Allow reed switches to cool before re-soldering or unsoldering. Maximum soldering temperature is 260 °C.

Recommended distance between the glass end and a bending point should be 3mm min. When bending, the reed switch (but not glass body) should be firmly held to avoid breaking glass. Re-bending is not acceptable. Figure 15 shows cutting techniques.

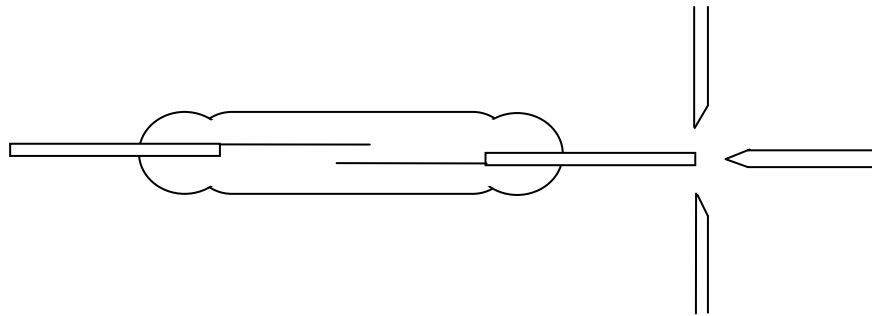


Fig. 15

Note: bending and cutting can change pull-in and drop-out characteristics.



Deeter Electronics Ltd follows a policy of continual development of its products and reserves the right to change specifications and/or features without notice

Deeter House, Valley Road, Hughenden Valley, Bucks. HP14 4LW

Tel: +44 (0) 1494 566046 Fax: +44 (0) 1494 563961 Email: sales@deeter.co.uk

www.deeter.co.uk