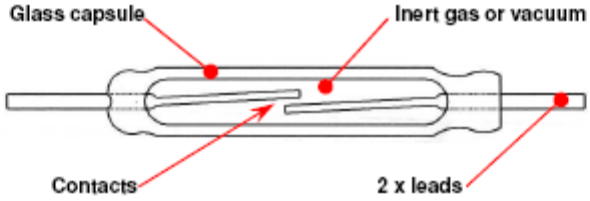
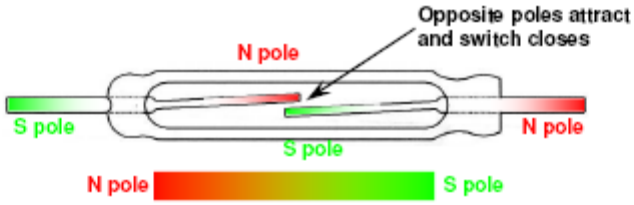
Reed switch structure and operation:

The form A reed switch comprises of two ferromagnetic reeds placed with a gap in-between and hermetically sealed in a glass tube. The glass tube is filled with an inert gas, (nitrogen), or a vacuum to prevent the oxidation of the contacts. The surfaces of the reed contacts are plated with metals from the platinum group such as rhodium, ruthenium, palladium or iridium either by electroplating or sputtering.



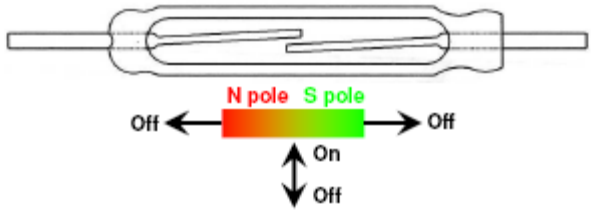
The reed switch is operated by the magnetic field of an energised coil or a permanent magnet which induces north (N) and south (S) poles on the reeds. The reed contacts are closed by this magnetic attractive force. When the magnetic field is removed, the reed elasticity causes the contacts to open the circuit



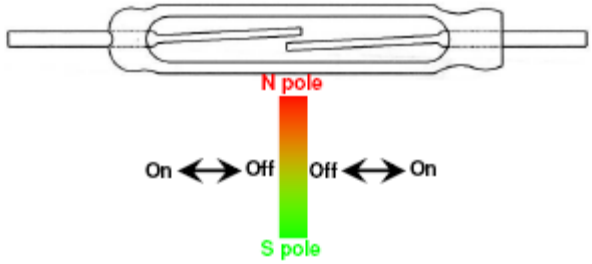
Reed switch actuation:

In all systems, magnet and reed switch must be brought to within a specific proximity of each other. This distance will vary in accordance with the sensitivity of the reed switch, the amount of lead that is cropped and the strength of the magnet. As the lead is cut the switch sensitivity decreases as there is less ferro-magnetic material to attract the magnet flux. When the magnet is close enough, the normally open contacts will close, when the magnet is removed the contacts will open. The relative distance for operation is always less than that for a release. Examples of proximity motion switching are shown below:

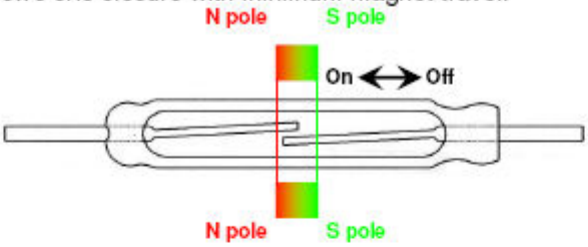
Provides only one closure with maximum magnet travel:



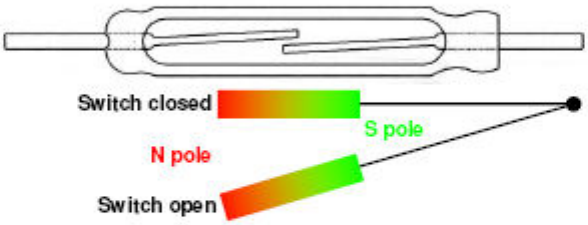
Provides as many as three closures with maximum magnet travel:



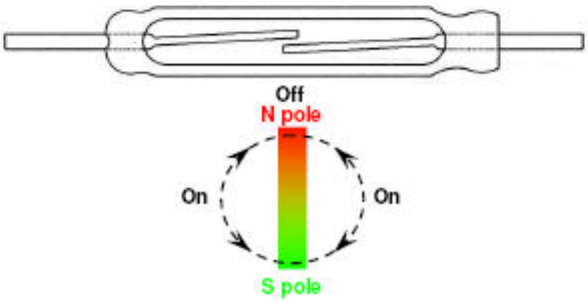
Ring magnet actuation allows one closure with minimum magnet travel.



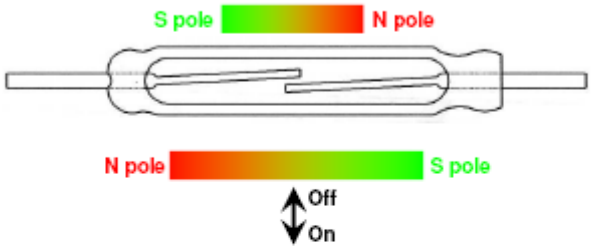
Large angular magnet travel necessarv to achieve one switch closure.



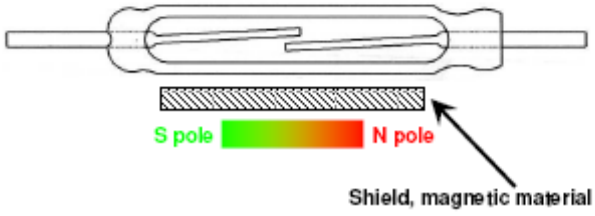
Rotating the magnet or reed switch, normal to their axes, reverses magnetic polarity resulting in two closures per revolution. When these axes are parallel, the switch closes. When the axes are perpendicular, the switch opens. Although the poles reverse, they still induce the opposite poles that close the reed switch.



A biasing effect is produced by placing a stationary magnet near the reed switch, to keep it normally closed. The approach of another magnet with reversed polarity cancels the magnetic lines of force, and the reed switch opens. Care should be taken not to bring the actuating magnet too close to the biased reed switch, as it could close again. The same effect can be achieved using only two leads of a form C switch.



In this type of actuation, magnet and reed switch are permanently fixed in such a position that the reed switch contacts are closed. A piece of ferromagnetic material is passed between the magnet and the reed switch, to cause drop out. The magnetic field is shunted, eliminating the attraction between the reeds. When the shield is removed, the reed switch closes.



Typical applications for reed switches are:

- Proximity sensors.
- General fluid level sensors including the following automotive specific applications:
  - Brake fluid level.
  - Windscreen washer fluid level.
  - Engine coolant fluid level.
- Flow sensors.
- Reed relays.
- Pedometers.
- Bicycle computers.
- Exercise machines.
- Gas, water and electricity meters.
- Rice cookers.
- Security, (door and window contacts).
- Electric toothbrushes.
- Humidifiers.

Glossary:

Ampere Turn (AT):
The product of the number of turns of wire in an electromagnetic coil winding and the current in amperes passing through the winding. This is a direct measure of the magnetic field generated, and of a reed contact's sensitivity.

Bounce:
Intermittent opening and closing of closed contacts or closing and opening of open contacts, usually implying the motion resulting from contact impact.

Bounce Time (in milliseconds):
Time taken for a bounce.

Breakdown Voltage:
The voltage which may be applied between insulated parts of a reed contact without damage, arcing, breakdown, or causing excessive leakage.

Carry Current (in Amps):
The maximum current that can be applied to an already closed contact.

Contact Rating (in Watts):
The maximum power, a reed contact can switch.

Contact Resistance (CR):
The electrical resistance of closed contacts.

Curie temperature:
Temperature at which a magnet is totally demagnetized.

Differential:
The difference between operate AT and release AT often expressed as %.

Drop Out (DO):
See Release AT.

Form A:
A normally open type of reed contact.

Form B:
A normally closed type of reed contact.

Form C:
A change-over type of reed contact where break happens before make.

Form D:
A change-over type of reed contact where make happens before break.

Form E:
A latching, or bi-stable type of contact, which stays in the last energised state, without the need for maintaining the field.

Hysteresis:
See differential.

Insulation Resistance:
The electrical resistance measured between insulated terminals.

Omni-polar:
A type of device that will function with either pole of a magnet.

Operate AT (OAT):
The measured value, in AT, at which a reed contact closes. This is valid for the closing operation of form A, B, and E type reed contacts and the change over operation from the normally closed contact to the normally open contact for form C and D type reed contacts.

Operating Temperature:
The temperature range over which the reed contact will meet all specified operating parameters.

Operate Time:
The time interval from coil energisation, to the closing of the reed contact. Where not otherwise stated, the functioning time of the reed contact in question is taken as its initial functioning time, not including contact bounce.

Over-drive (in AT):
The AT given above OAT, before measurement of CR.

Pull In (PI):
See Operate AT.

Release AT (RAT):
The measured value, in AT, at which a reed contact opens. This is valid for the opening of form A, B, and E type reed contacts, and the change over from the closed normally open contact to the open normally closed contact for form C and D type contacts.

Release Time:
The time interval from coil de-energisation to the opening or change over of the reed contact. Where not otherwise stated, the functioning time of the reed contact in question is taken as its initial functioning time, not including contact bounce.

Resonance Frequency (in Hz):
The frequency where a reed contact will chatter, or starts sympathetic vibration.

Saturation:
Magnetic saturation exists when an increase of magnetisation applied to a reed contact does not increase the magnetic flux.

Switching Voltage (in Volts):
The maximum voltage a reed contact can switch.

Switching Current (in Amps):
The maximum current a reed contact can switch.