

# Magnet and Actuator Operation



Magnets and Actuators Application Notes

# Magnet and Actuator Operation

## With a Reed Switch

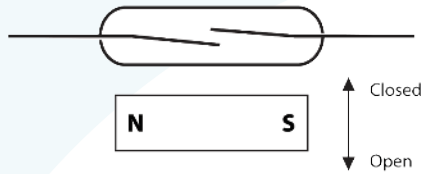
### With a Magnet

A reed switch is activated by a magnetic field. It's important to realize that there are numerous possibilities for orientation of a switch within a given magnetic field. The diagrams on the next page show several basic examples of reed switch operation with the use of a moving and stationary magnet.

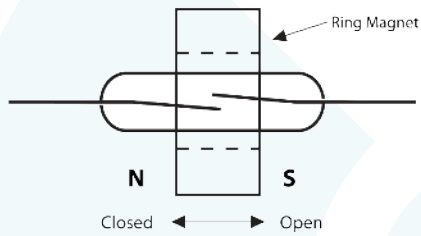
The length of the magnet and the length of the reed switch both affect the magnetic field coupling.

The physical parameters of a magnet—such as length, width, thickness or diameter—impact the size and shape of the resultant magnetic field. For example, an M-01 (.062 h/w x .50 length Alnico) must be very close to a reed switch to ensure operation, while an M-15 (.250 dia. x 2.25 length, Alnico) will operate a reed switch at a much greater distance.

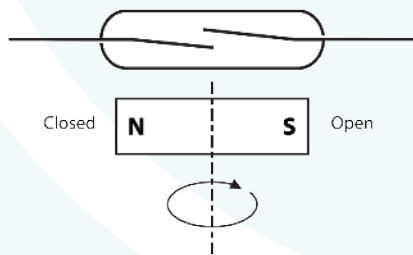
As explained on the previous page, reed switches are activated by magnetic fields. It's important to realize that there are numerous possibilities for a switch's orientation within a given magnetic field. On this page, you can see several basic examples.



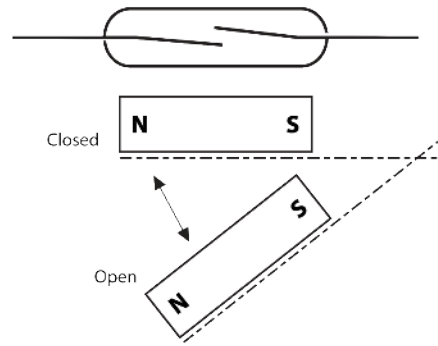
A magnet moved in a front to back motion (perpendicular towards and away) will operate the reed switch



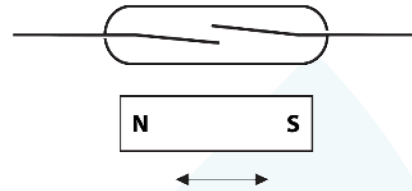
A reed switch moving through a circular/ring magnet will operate up to 3 times.



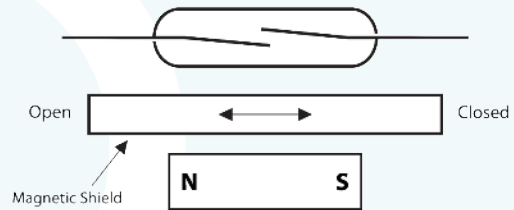
**Rotation:**  
Magnets can be rotated several different ways to operate the reed switch. For more information on the effects of rotary magnetic motions, contact HSI Sensing.



A pivoting/swinging magnet will operate the reed switch.

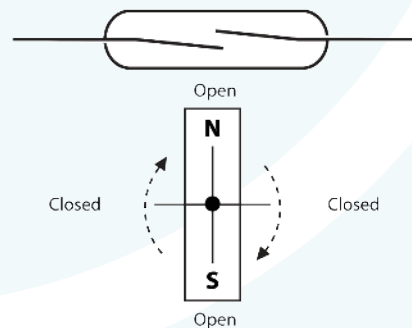


A reed switch can operate with a magnet moving parallel to the reed switch.



**Shielding (Indirect Actuation):**

If the reed switch and magnet are stationary, the movement of a shield (made of ferro-magnetic material) between the switch and the magnet will open and close the switch's contacts. The shield is used to divert the magnetic field away from the switch.

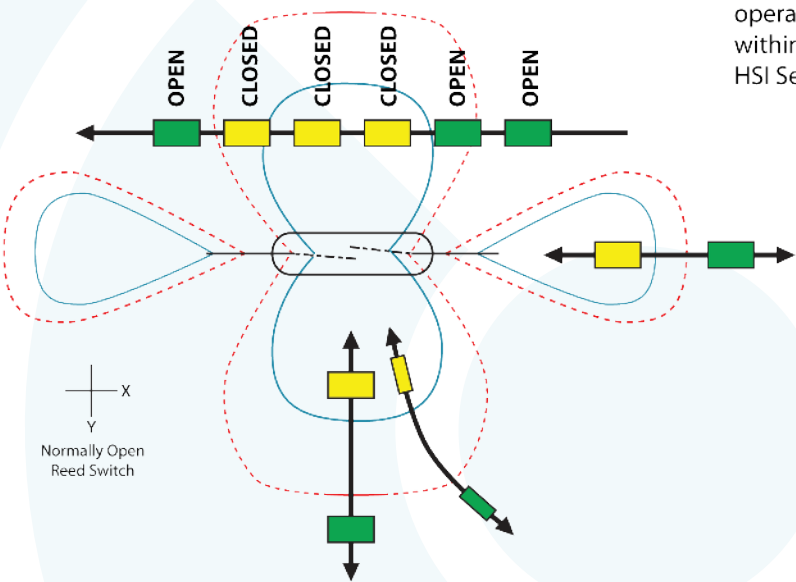


# Common Paths of Reed Switch Activation...

- ↔ A magnet's path
- The magnet is activating the switch
- The magnet is not activating the switch
- The point of activation, also known as Operate or Pull-In
- ▬ The Point of de-activation, also known as Release or Drop-Out

A magnet can actuate a reed switch several different ways. The drawing below demonstrates several common paths a magnet travels to operate the switch's contacts. The blue line represents the point at which the switch is activated by the magnet (also called the Release or Drop-Out). As shown in the drawing, a magnet must pass the Operate point (blue line) for the switch to be activated. To de-activate the switch the magnet must travel outside the Release point (red dotted line).

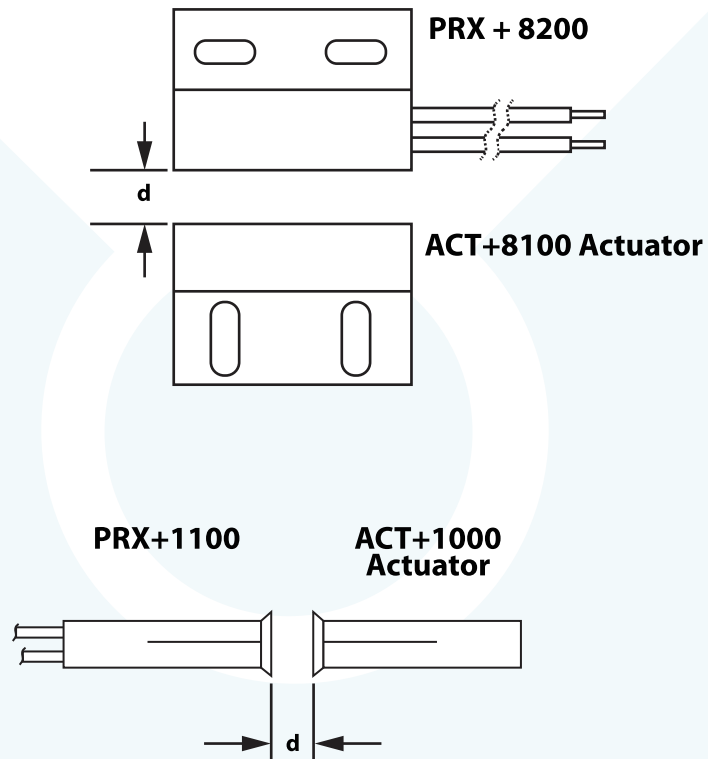
If you have specific questions about the operation of a reed switch, especially within a certain application, please contact HSI Sensing.



## With a Proximity Sensor

For proper alignment, position and location, please refer to the product specification sheet. An example is provided below.

Please note that a shorter magnet or actuator has a shorter field, and a longer magnet or actuator has longer field.





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