

Magnets

1. Hard ferrite magnets

Barium and strontium hard ferrites are economically priced, reliable components that are also widely used in automation, control and measurement applications. When operated in high temperature ranges, the specified switching distance will decrease by a factor of 0.2 % per 1 °C.

Chemical properties:

Ferrite magnets are oxide ceramics. They are made of approx. 80 % iron oxide and 20 % barium oxide or strontium oxide. The magnets are resistant to a large number of chemicals, including solvents, caustic solutions and weak acids. If strong organic and inorganic acids, e.g. hydrochloric, sulphuric and hydrofluoric acid, are used, their resistance will basically be determined by the temperature, concentration and reaction time of the medium. In general, the resistance should first be determined by means of longterm tests.

Mechanical properties:

Due to their ceramic characteristic, ferrites are brittle and sensitive to shock and bending loads.

2. Rare-earth magnets

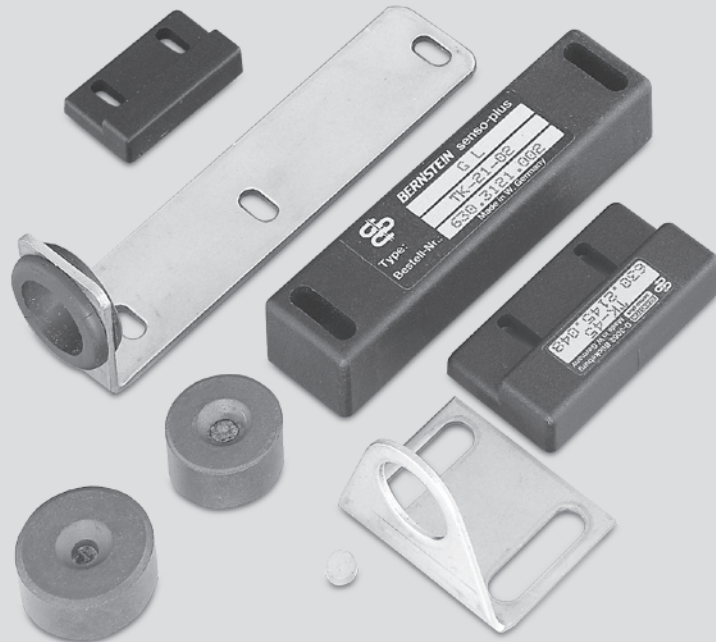
Permanent magnets made from samarium cobalt and neodymium iron boron are high performance and high quality components that are widely used in drive and control engineering. When operated in high temperature ranges, the specified switching distance will decrease by a factor of 0.02 % per 1 °C.

Chemical properties:

All rare-earth magnets are metallic materials and show the corresponding characteristics associated with these materials, e.g. the polished shine immediately after being machined. The magnets are surface-treated (e.g. nickel coating) to protect them from environmental influences.

Mechanical properties:

Minor chips may occur if rare-earth magnets are subjected to impact stress. They respond very sensitively to vibrations and may become demagnetised.



3. Plastic-bound magnets

Plastic-bound permanent magnets have an attractive price-performance ratio and thanks to the way they are formed they can be produced with complex geometries.

Injection-moulded magnets are typical composite materials. The magnetic powder is embedded in thermoplastic materials (polyamides). One of the main advantages of plastic-bound magnets is that they can be formed into a diverse range of shapes.

Chemical properties:

Surface corrosion can rarely be found on plastic bound magnets. For this reason, they can be used in most fields of application without additional coating.

Mechanical properties:

Plastic-bound magnets can be subjected to buckling and bending without breaking or chipping.

Use in potentially explosive atmospheres

Magnets must not be used in potentially explosive atmospheres as they can cause sparks. Grinding dust and chips from rare-earth magnets are self-igniting and burn off at high temperatures. They should therefore only be machined using ample water and never in dry conditions since even dried grinding dust can ignite.

Strong magnetic fields

Strong magnetic fields can interfere with or even damage electronic or mechanical equipment. This includes cardiac pacemakers. Appropriate safety distances are specified in the corresponding manuals or may be requested from the manufacturers.

Radioactive radiation

Permanent magnets must not be exposed to longterm radioactive radiation otherwise they may lose their magnetism.

Effects on persons

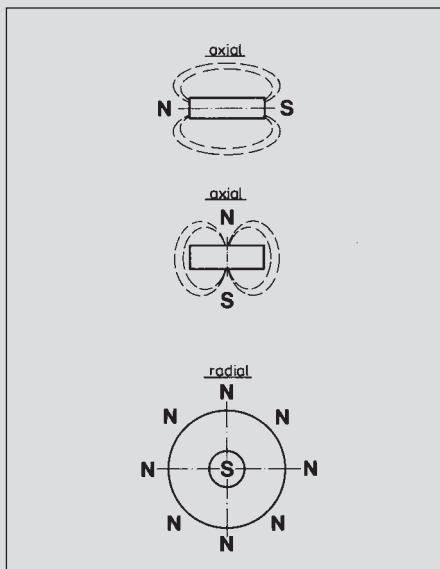
There are no known side-effects caused by touching magnet materials.

Magnet shapes

Rectangular, circular and cylindrical magnets are the most common shapes of permanent magnets manufactured in a press-shaping process. In addition to these standard geometries, permanent magnets may be manufactured in many other shapes. The shape should preferably be defined during the pressing process since subsequent shaping can only be performed using complex diamond tools. Holes and openings can only be made in the pressing direction.

Directions of magnetisation

The term preferred direction refers to the alignment of the magnetic crystals in a certain direction. The magnet achieves its highest magnetic values in this preferred direction and must therefore be magnetised in this direction.



The preferred direction is achieved by subjecting the magnetic powder to a strong external magnetic field (coil) during the pressing process. As magnets have no preferred direction, the magnetisation direction and type can be freely selected.

Mounting a magnetic switch system on ferromagnetic materials

The nominal distance may be reduced when magnetic limit switches and their actuating magnets are mounted on magnetisable material (Fe, etc.). To ensure trouble-free operation, a minimum gap of 15 mm between the magnetic switch and any material that can be magnetised should be maintained as a reference value. The same applies to the actuating magnets.

Applications

- ⌘ Counting
- ⌘ Position indication in lifts
- ⌘ End position switches in pneumatic and hydraulic installations
- ⌘ Position indication on butterfly valves, slide valves and valves in general
- ⌘ Conveyors in high-bay shelving
- ⌘ Position detection in textile, packaging and meat cutting machines
- ⌘ Machine runtime and downtime monitoring
- ⌘ Control of machine tools
- ⌘ Level monitoring of liquids (see Float Switches)