Magnets

1. Hard Ferrite Magnets

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

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

Mechanical characteristics:
Due to their ceramic character, ferrites are brittle and are sensitive to shock and bending loads.

2. Rare-earth magnets

Permanent magnets that are made from samarium cobalt and neodymium iron boron are high-performance and high-quality components that are especially used in drive and control engineering.

If used in higher temperature ranges, the specified switching distance has to be decreased by a factor of 0.02% per 1°C.

Chemical characteristics:
All rare-earth magnets are metallic materials and show the corresponding characteristics associated with these materials (e.g. the polished shine immediately after being processed). The magnets will oxidise in moist surroundings and acidic environments may decompose them. Conversely, the magnets are extremely resistant to alkaline environments. In water with a pH-value of 7, rare-earth magnets will show only slight surface oxidation but otherwise are resistant.

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

3. Plastic magnets

Plastic-bound permanent magnets have an interesting cost-performance ratio and can be produced in a large variety of shapes. Sprayed magnets are typical composite materials. The magnetic powder is embedded in thermoplastics (polyamides), allowing the most diverse shapes to be created.

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

Mechanical characteristics:
Plastic magnets can be submitted at any time to bending and vibrations without breaking or chipping.

Application in explosion-hazardous surroundings

Magnets must not be handled in explosion-hazardous surroundings since they can cause sparks. Grit and chips from rare earth magnets are self-igniting and burn off with very high temperatures. They should therefore only be machined using a lot of water and never in dry conditions since even dried grinding dust can ignite.

Strong magnetic fields

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

Radioactive radiation

Permanent magnets must not be submitted to long term radioactive radiation or they may lose their magnetisation.

General stability

Rare earth magnets must be stored in dry conditions in order to avoid oxidisation. They are not suitable for all environments since they are also partially soluble.

Effects on persons

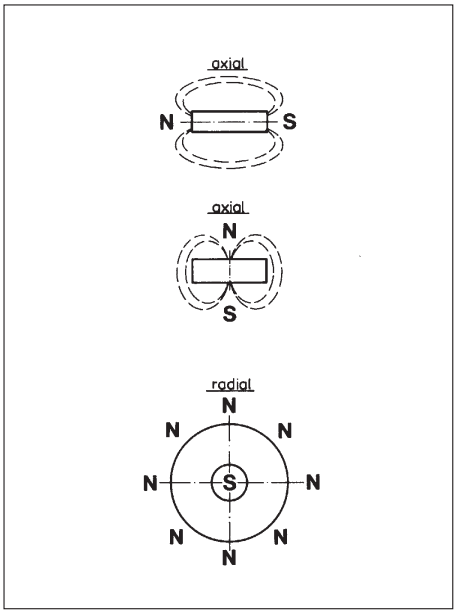
There are no known side-effects caused by touching magnet materials.

Magnet shapes

Rectangular, circular and cylindrical magnets are the most common shapes of permanent magnets. In addition to these standard shapes, permanent magnets may be manufactured in many other shapes. The shape is in most cases designated during the pressing of the magnet, since any later shaping can only be performed using complex diamond tools. Holes and openings can only be inserted in line with the pressing direction.

Magnetisation direction

Magnetisation in alignment with the formed magnetic crystals is preferred since this allows the highest magnetic values to be achieved.



The preferred direction is achieved by submitting 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 selected freely.

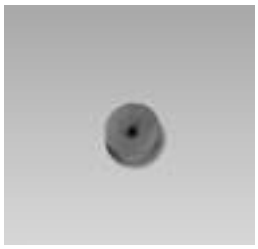
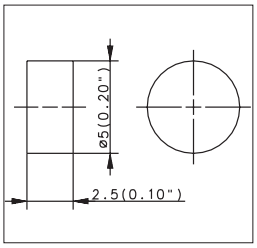
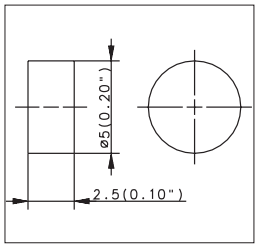
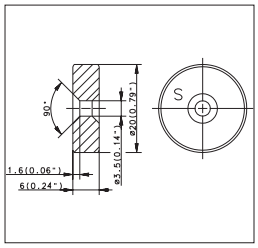
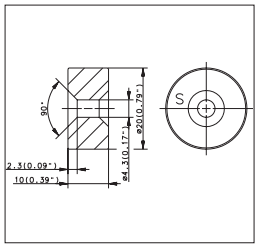
Instructions for mounting a magnetic switch-system on ferromagnetic materials

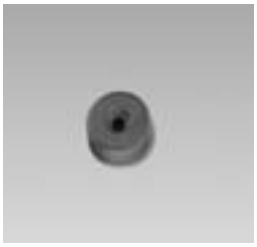
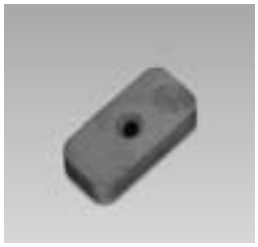
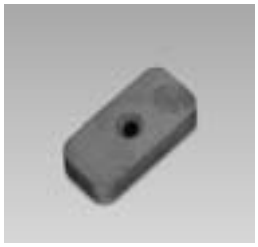
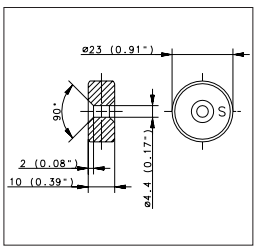
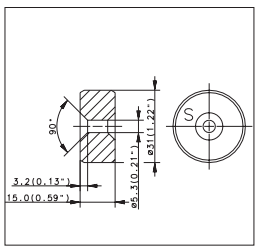
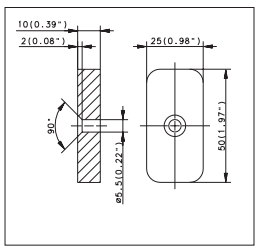
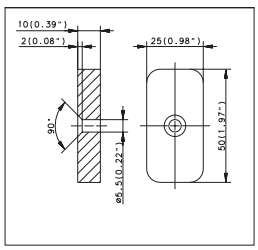
If magnetic limit switches and their corresponding magnets are mounted on magnetisable material (Fe, etc.), the nominal distance may be reduced. To ensure error-free operation, a minimum gap of 15 mm between the magnetic switch and any material which can be magnetised should be maintained as a guide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

Applications

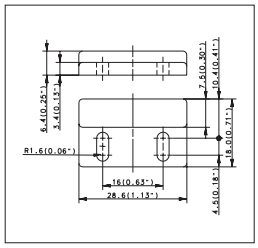
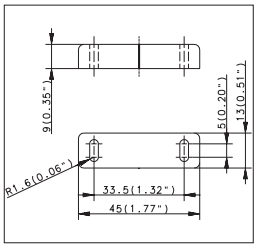
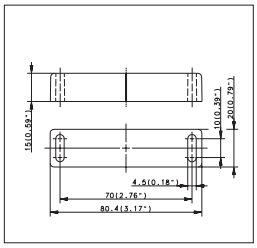
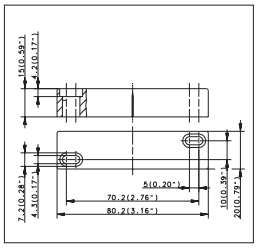
- counting
- position indication in lifts
- end-stop switches in pneumatic and hydraulic installations
- indication on claps, sliders and valves
- conveyors in high-bay shelving
- position detection in textile, packaging and meat-cutting machines
- run-time and down-time monitoring of machines
- control of machine tools
- level control of liquids (see page 240 ff. for more details)

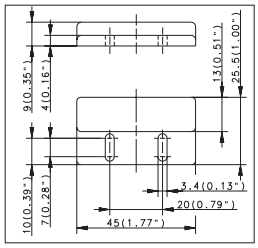
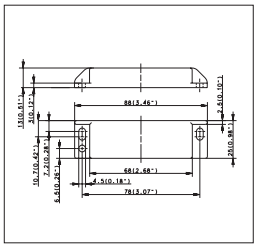
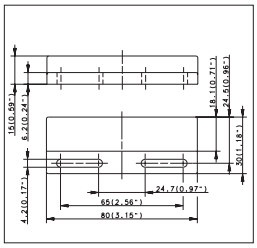
Accessories
Magnets without encapsulation

Magnets without encapsulation	T-75	T-06N/S	T-61N/S	T-67N/S
				
Magnet material	Rare-earth	Neodym-Eisen-Bor (NdFeB)	Bariumferrite	Bariumferrite
Temperature range	-40 °C…+150 °C	-40 °C…+150 °C	-40 °C…+150 °C	-40 °C…+150 °C
(in relation to magnetic switch application)	-40 °F…+302 °F	-40 °F…+302 °F	-40 °F…+302 °F	-40 °F…+302 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K	0.2 %/K
Housing material	-	-	-	-
Part number	**630.1175.057**	**630.1106.065**	**630.1261.035**	**630.1167.054**
All dimensions in mm (inch)				
		Marking: slit on north pole side		

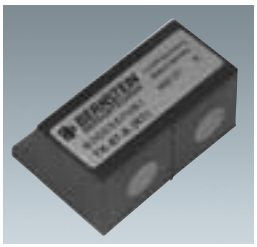
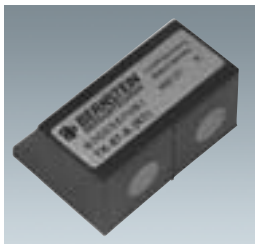
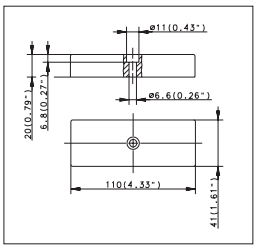
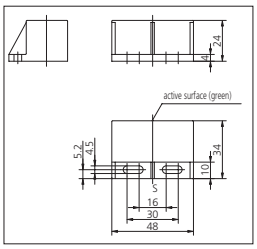
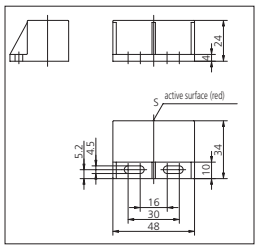
Magnets without encapsulation	T-62N/S	T-69N/S	T-68N	T-68S
				
Magnet material	Bariumferrite	Bariumferrite	Bariumferrite	Bariumferrite
Temperature range	-40 °C…+150 °C	-40 °C…+150 °C	-40 °C…+150 °C	-40 °C…+150 °C
(in relation to magnetic switch application)	-40 °F…+302 °F	-40 °F…+302 °F	-40 °F…+302 °F	-40 °F…+302 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K	0.2 %/K
Housing material	-	-	-	-
Part number	**630.1262.039**	**630.1269.031**	**630.1268.028**	**630.1368.033**
All dimensions in mm (inch)				
			90° chamfering on north pole side	90° chamfering on south pole side

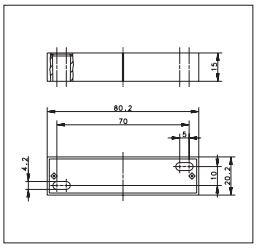
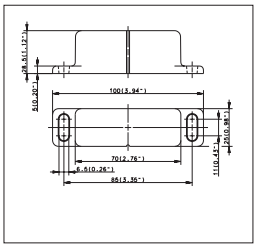
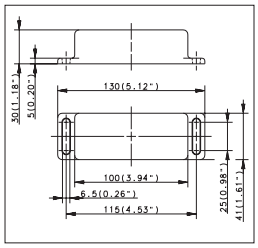
Accessories
Magnets in plastic housings

Magnets in plastic housings	TK-11-11	TK-11-01	TK-21-02	TK-21-12
				
Magnet material	AlNiCo-500	AlNiCo-500	AlNiCo-500	AlNiCo-500
Temperature range	-20 °C…+80 °C	-20 °C…+80 °C	-20 °C…+80 °C	-20 °C…+80 °C
(in relation to magnetic switch application)	-4 °F…+176 °F	-4 °F…+176 °F	-4 °F…+176 °F	-4 °F…+176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K	0.2 %/K
Housing material	PA 6.6	PA 6.6	PA 6.6	PA 6.6
Part number	**630.2111.047**	**630.3111.001**	**630.3121.002**	**630.2121.030**
All dimensions in mm (inch)				

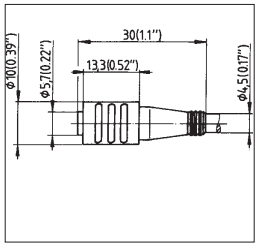
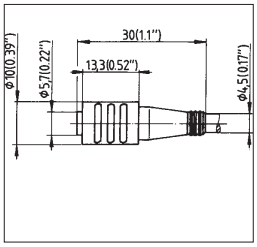
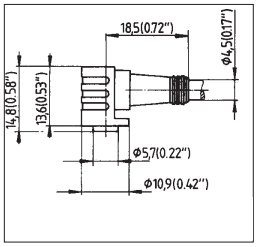
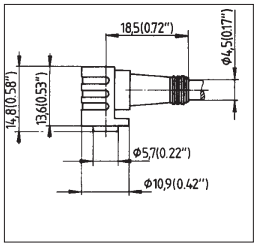
Magnets in plastic housings	TK-45	TK-42	TK-44
			
Magnet material	AlNiCo-500	AlNiCo-500	AlNiCo-500
Temperature range	-20 °C…+80 °C	-20 °C…+80 °C	-20 °C…+80 °C
(in relation to magnetic switch application)	-4 °F…+176 °F	-4 °F…+176 °F	-4 °F…+176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.,2 %/K
Housing material	PA 6.6	PA 6.6	PA 6.6
Part number	**630.2145.048**	**630.2142.049**	**630.2144.050**
All dimensions in mm (inch)			

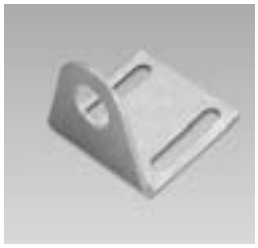
Accessories
Magnets in metal housings
Mounting brackets

Magnets in metal housings	TK-50	TK-57N	TK-57S
			
Magnet material	Bariumferrit	Bariumferrit	Bariumferrit
Temperature range	-20 °C…+80 °C	-20 °C…+80 °C	-20 °C…+80 °C
(in relation to magnetic switch application)	-4 °F…+176 °F	-4 °F…+176 °F	-4 °F…+176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K
Housing material	PA 6.6	PBT	PBT
Part number	**630.2100.053**	**630.2257.060**	**630.2357.061**
All dimensions in mm (inch)			

Magnets in metal housing	TA-21-02	TA-31	TA-33
			
Magnet material	AlNiCo-500	AlNiCo-500	Bariumferrit
Temperature range	-40 °C…+150 °C	-20 °C…+80 °C	-20 °C…+80 °C
(in relation to magnetic switch application)	-40 °F…+302 °F	-4 °F…+176 °F	-4 °F…+176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K
Housing material	Al	Al	Al
Part number	**630.5121.064**	**630.3131.005**	**630.3133.034**
All dimensions in mm (inch)			

Accessories
Miniature
snap-in connectors

Miniature snap-in connectors	**GDK-R06US/S00-2.5PU**	**GDK-R06US/S00-5PU**	**WDK-R06US/S00-2.5PU**	**WDK-R06US/S00-5PU**
Terminal code **1 = brown** **2 = black** **3 = blue**				
				
Material of cable sleeve	PUR	PUR	PUR	PUR
Material of coupling	PA 12	PA 12	PA 12	PA 12
Material of body	POM	POM	POM	POM
Operating voltage	60 VAC/75 VDC	60 VAC/75 VDC	60 VAC/75 VDC	60 VAC/75 VDC
Current-carrying capacity	3A	3A	3A	3A
Temperature range	-25 °C…+90 °C -13 °F…+194 °F	-25 °C…+90 °C -13 °F…+194 °F	-25 °C…+90 °C -13 °F…+194 °F	-25 °C…+90 °C -13 °F…+194 °F
Cable length	2.5 m	5 m	2.5 m	5 m
Cable structure	3 x 0.25 mm²	3 x 0.25 mm²	3 x 0.25 mm²	3 x 0.25 mm²
Protection class after installation	IP67/NEMA 4	IP67/NEMA 4	IP67/NEMA 4	IP67/NEMA 4
Part number	**413.9100.219**	**413.9100.220**	**413.9100.221**	**413.9100.222**
Dimension diagrams				

Mounting brackets	**BWN-M06NI/40 x 47**	**BWN-M06NI/27 x 38**	**BWN-M36NI**
			
Material	Niro 1.4301	Niro 1.4301	Niro 1.4301
for models	MA-06, MA-16, MA-26, MA-15	MA-06, MA-16, MA-26, MA-15	MA-06, MA-16, MA-26, MA-15
Part number	**410.2802.001**	**410.2802.002**	**490.4700.035**
Dimension diagrams