



MAGNASPHERE CORP.

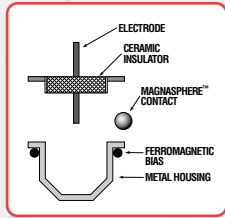
Solutions Seeking Problems



FEATURES

The Magnasphere® switch represents the first significant improvement in magnetic switch and sensor technology since the introduction of the reed switch in the 1950's. This new technology overcomes the inherent weaknesses of the reed switch (fragility, tamper susceptibility, size), while retaining the beneficial characteristics (non-contact actuation, sealed contacts), and provides additional application capabilities (ferrous proximity sensing, non-mercury tilt and tamper sensing).

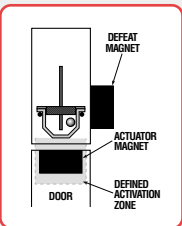
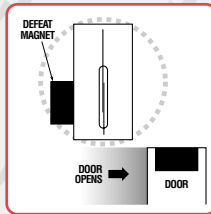
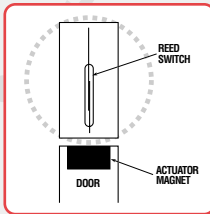
The simplicity of the Magnasphere switch rivals the straightforward design of the reed switch; however, the switch's design yields superior performance in a wide number of applications. Diagrams of Magnasphere's technology appear below:



The basis of the technology is a magnetic sphere, or ball contact that is illustrated above. The sphere is housed in a durable metal housing. Completing the switch is a seal that contains the contacting electrode, insulated from the magnetic perimeter by a ceramic to metal bond. The case or seal provide the second contact point required to complete the electrical circuit. The seal/electrode cap is welded to the housing in an inert atmosphere providing an hermetically sealed contact. Post-assembly magnetizing activates the magnetic properties of the contact

MAGNETIC NON-DEFEAT

Despite its simple design and general acceptance, the reed switch has several disadvantages that impair its performance. In home, commercial and even military security systems, reed switches are employed as sensors that, if disturbed, indicate a security breach. Sensors are typically installed in doorframes. An actuating magnet housed inside a closed door forces the reeds into contact, completing the circuit. If this magnetic field is removed, the security system reacts. However, reed switches are simple to defeat. The reed switch responds indiscriminately to magnetic fields. If a second magnetic field is placed within range of the reed switch, an intruder can open the door without opening the circuit and triggering an alarm (see diagram).



Magnasphere's patented technology utilizes the principle of spherical magnetism to provide security contacts that are resistant to magnetic tamper and defeat. In addition, the hermetically sealed metal construction makes them virtually indestructible. Homeowners can now have the same level of magnetic tamper protection required by the government.

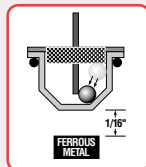
The Magnasphere Switch has a defined activation area. The switch is closed only when a magnet is present under the switch pulling the magnetic sphere to the bottom of the case, contacting the electrode.

A stronger defeat magnet outside of the defined area will pull the ball out of the lower position to open the switch and sound the alarm.

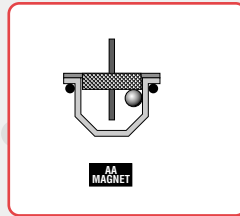
A weaker defeat magnet will have no effect. Opening the door will trigger the alarm.

FERROUS PROXIMITY SENSOR

Because the spherical contact is a magnet, the Magnasphere switch can be actuated by the presence of ferrous metal (i.e. an external magnet is not required). This unique feature allows the Magnasphere to be utilized as the lowest cost Ferrous Proximity sensor available. This capability is not possible with stand-alone reed or Hall Effect switches.

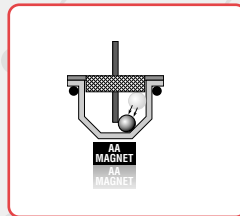


Utilizing the Magasphere's Ferrous Proximity capability with a ferrous metal ball, in a contained housing, a low cost, low jitter, non-mercury tilt switch can be configured.

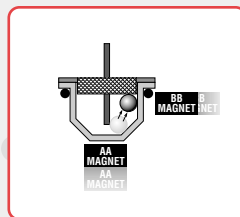


FUNCTIONALITY

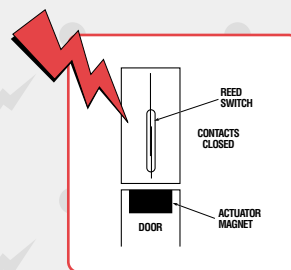
In the open position, the magnetic sphere is attracted to the ferromagnetic bias ring, away from the electrode. Because of this attraction, the switch may be positioned in any orientation and will remain open.



When an actuating magnet approaches the switch from the end of the switch opposite the electrode, the magnetic ball is attracted to this field, and "snaps" to the bottom of the case, making contact with the electrode and case, closing the switch.

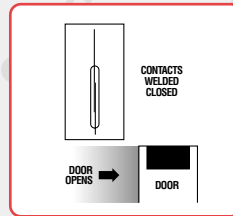


The Company's technology utilizes the principle of spherical magnetism. The spherical shape is not polarity sensitive and will be attracted to either pole of the actuating magnet. Unlike a reed switch that responds to a magnet within a global activation zone, the Magnasphere switch responds to a magnet only within a restricted zone. A stronger magnet outside the zone pulls the ball off the center electrode to open the switch.

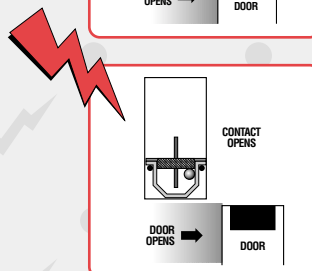


HIGH VOLTAGE RESISTANCE

- 500,000 VDC Test
- Reed switch contacts permanently weld – fail closed



- Door / Window opens, switch indicates all secure – system failure



- Normal Door / Window magnet movement pulls spherical contact off electrode
- No system failure - alarm triggered



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CONTACT CHARACTERISTICS

Contact form – A (N.O.) or B (N.C.)

Contact Material - Gold/Gold

Initial Contact Resistance (Typical) - < 150 milliohms

Contact Capacitance - < 1pf

Contact ratings* - Logic/Resistive loads to 30VDC @ 20ma

**Relay Coil loads to 190ma at 13VDC - contact manufacturer with application specifics*

Contact Bounce* (Typical) - < 10 milliseconds

**Recommended trial de-bounce - 15 milliseconds (min.)
closed contact condition for logic state changes - or 30Hz low pass filter buffer*

Minimum Breakdown Voltage (Typical) - 300 VDC

Insulation Resistance (Typical) - > 5 Mega Ohms

OPERATION CHARACTERISTICS

Operate/Release - Magnet (Typical) - 160 Gauss/70 Gauss

***Example:** 1/2" (12.7mm) Dia. X 3/16"Lg. (4.8mm) Neo 30 – typical air gaps – OP 1/2" (12.7mm)/REL 3/4" (19mm)

Operate/Release - Ferromagnetic Target (Typical)

OP 1/16" (1.59mm) / REL 3/32" (2.38mm)

Actuation Magnet Orientation - Either Pole

Maximum Operating Frequency - 20Hz

Mounting Position - Any Plane

Operating Temperature (°C) - -40 to +150

Shock (Switch Damage) - > 100 G's

Vibration* - 10-15 G's (80-450 Hz) **Higher Values Available*

GENERAL CHARACTERISTICS & INFORMATION

Construction - Stainless Steel Housing – Compression Seal Hermetically Sealed – Protective Gas Atmosphere – Precious Metal Plated Spherical Magnet Contact

Soldering Guidelines - 600°F (315°C) Temperature iron for 5 seconds (max.). Do not solder within 1/8" (3mm) of glass seal. Lead pins precious metal plated for enhanced solderability.

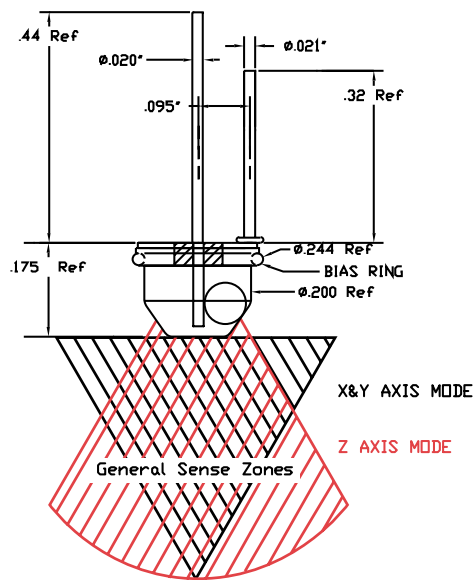
Termination Polarity Guidelines - Polarity selection is non-critical, though some life gain may be realized by center pin as cathode on logic loads, but center pin as anode on larger loads.

Leadwire Cutting & Bending Guidelines - Cut length has no effect on magnetic OP/REL values. Shearing action type cutters are recommended, but end-nippers and side cutters are NOT recommended. Metal style seals are extraordinarily rugged, but the bending of unsupported lead wire pins adjacent to the glass seal is not recommended (i.e. when bending use the support of some type of parallel jaws spaced away from the glass seal to grip the lead wire pins while bending the pins' free ends, so no bending strains are imposed on the glass seal.

Other Comments - Ferromagnetic materials and strong Electro-magnetic devices proximate to the switch or its actuator magnet may adversely affect expected OP/REL switching values.

Experimentation is recommended to investigate areas of concern.

SWITCH WEIGHT (Typical) - 370 Milligrams



The Magnasphere™ Advantage

Category	Reed Switch	Magnasphere Switch
Construction	Glass/Metal Oxide Bonded	All Metal Switch
Durability	Fragile Even When Packaged	Virtually Indestructible
Automated Printed Circuit Board, SMT Assembly / Wave Soldering	Difficult and Expensive Limited Availability and Costly	Simple and Cost Effective Easily Configured
Plastic Insert Molding	Fragility a problem	Can Be Insert Molded Lower Assembly Costs
Electromagnetic Interference	Problematic - Easily Affected	Not Affected
Use as Ferrous Proximity Sensor	Requires Magnet to Operate Cost and Size Issues	Only Stand-Alone Technology w/ this Capability; Lower Cost
Magnetic Activation / Defeat	Global - Easily Defeated	Defined Zone - Cannot Defeat
500,000 VDC Security Defeat Test	Contacts Weld Permanently. Switch Fails Closed.	Door Magnet Movement Opens Contact. Switch Functions Normally.

Magnasphere as a replacement for Hall effect switches:

- Does not require third wire as a power source
- Does not drain battery supply during stand-by
- Operates on similar magnetic field strengths
- Does not require RFI/EMI protective filter
- Does not sense only one magnetic polarity
- Uses similar PCB "real-estate" area
- Does not require shielded wire harness
- Robust to shock forces and impact

US and INTERNATIONAL PATENTS

#5332992 #5530428 #5670321 #6506987 #6603378
#5880659 #5977873 #6087936 #6803845
and PATENTS PENDING



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P.O. Box 195 • Brookfield, WI 53008

262-792-1306 • Fax 262-792-9535

www.magnaspherecorp.com