

Magnet and Actuator Basics- Environmental Considerations



Magnets and Actuators Application Notes

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What is a magnet, and what is an actuator?

For our purposes, the most notable property of a magnet is that it generates a magnetic field that operates a reed switch or proximity sensor.

An actuator is simply a magnet placed in a housing. Customers often pair our actuators with our proximity sensors for a magnetic sensor package. Also, many of the actuator housings provide a way to mount the magnet onto a surface and provide environmental protection.

Basic Types

The three basic types of magnets that HSI Sensing typically uses in applications are Alnico, Ceramic and Neodymium. Each has different qualities and may be impacted by their surroundings.

Alnico

- Alnico rod and bar magnets have high residual induction and energy product compared with ceramic magnets, and low coercive force compared with ceramic and rare earth materials (more subject to demagnetization).
- Temperature stability in high temperature applications, and a maximum working temperature of approximately 1000°F (540°C).

Ceramic

- Low cost and good holding strength, block magnets offer economical magnet power for price-sensitive applications.
- Ceramic block magnets are charcoal grey in color, and do not appear metallic.
- Ceramic magnets are not suited for high temperature applications (over 250° C).

Neodymium

- Neodymium magnets are the most powerful commercially produced magnets.
- Neodymium magnets are hard and brittle and may chip or break if dropped.
- Neodymium disc magnets are magnetized through the thickness.
- Neodymium magnets are often assembled into products using strong adhesives such as Loctite® 325. Make sure that all contact surfaces are clean and dry prior to bonding.
- Please use caution when handling magnetized neodymium magnets. Their exceptional magnetic force may cause them to attract to metal (or to each other) so strongly that fingers in their path could be pinched or injured.

Magnetic Interference

- In proximity sensor applications, the magnet or actuator is intended to be the single source of magnetic field for operation. Counterfeit sources of magnetism can cause erroneous operation.
- Sources of magnetic interference:
 - Nearby components containing iron or magnetized parts, including brackets, bolts, washers, screws, nails, base metal, and the like.
 - Electronic components manufactured with ferrous materials can generate magnetic fields or become magnetized when exposed to magnetism. Such components include but are not limited to capacitors, batteries, motors, wire, and transformers.
- Any of these components can reshape or even significantly weaken the magnetic field when they are close to the magnet. Non-ferrous mounting hardware is recommended.
- Consider the chemical resistivity of your magnet and/or actuator housing based on your applications environment.



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