

Alarm Sensors Get No Respect

What do alarm contacts and Rodney Dangerfield have in common? They both get no respect! The alarm contact is a device that many technicians deal with every day, but rarely completely understand.

A few years ago, I had the unique opportunity to test most of the industry's alarm contacts. I tested for ease of installation and operational performance and reliability. The challenge for manufacturers was packing as much quality as possible into a very small footprint. One key step in evaluation was to reverse engineer them or, in layman's terms, carefully take them apart to see what was inside and how well they had been assembled.

To clear up the mystique surrounding these devices, it's fitting and proper to take a closer look at this workhorse of the security industry.

Normally Closed vs. Normally Open

Let's look at how magnetic proximity reed switches perform in an alarm circuit.

We all know that if you pull a magnet away from an alarm contact you will get an alarm activation, which, in most cases in our industry, is an opening in a closed series alarm loop. The alarm contact (reed sensor) in this case is technically a *normally open* (Form A) sensor.

Why does the industry call normally open reed sensors a *normally closed* alarm contact? Because standard use of the device relates to the normal non-alarm condition in a normally closed alarm circuit. This relationship can often be confusing to those who are not familiar with the alarm industry's nomenclature.

Note that a normally closed (Form B) reed switch sensor often has an



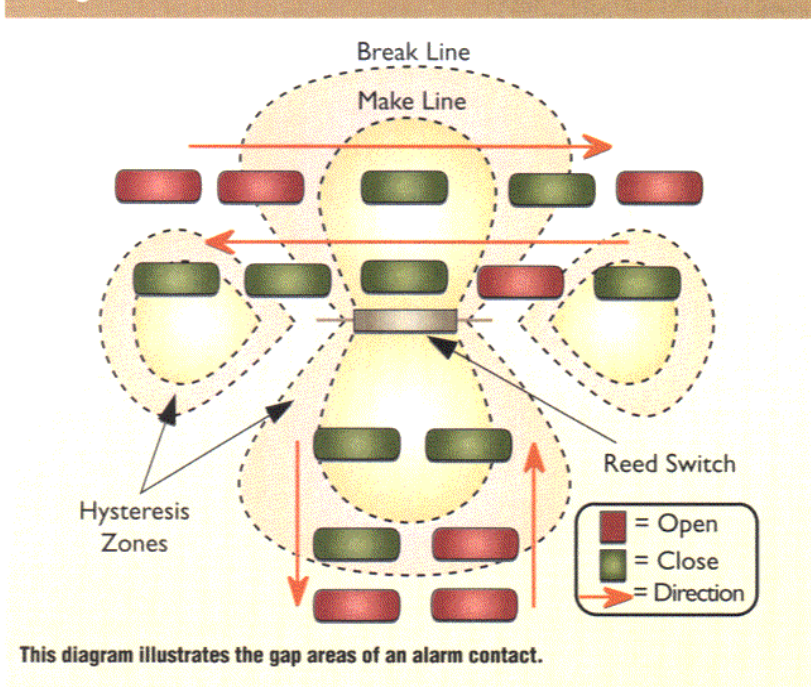
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BOB'S TIPS

- Don't tap or force recessed contacts in mounting holes.
- Most alarm contact failures are in the closed position, causing an alarm "miss".
- Offer extra in-line circuit lightning protection to your customers.
- Use switch wattage ($P=IE$) to calculate maximum contact switch loads.
- Mind The (hysteresis) Gap!

extra small magnet built into it to magnetically bias the metal reeds so they stay *in* the closed position unless influenced by an external magnet. Additionally, small booster magnets are placed in reed switch assemblies to make the switch contacts more sensitive for the popular wide-gap alarm contacts. This makes for an even tighter internal manufactured assembly.

Diagram 1: Reed Sensor's Area of Influence



Following the 50% Rule

When I first started installing surface contacts many years ago, a good rule of thumb was what I called the *50-percent rule*. I would move the cased magnet toward the reed until I heard a beep on my tester and then mount the sensors at 50 percent of the test distance.

Sure, I had seen some examples of reed/magnet orientations in manufacturer manuals (who reads those?). However, it was not until I experienced some false alarm problems on an overhead door (OH) contact that I took a closer look at the finer application details.

Differentiating Distances

The magnetized reeds in an alarm contact assembly have what I refer to

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as areas of *magnetic influence*. These areas (see *Diagram 1* on other page), though symmetrical, have serious detection gaps that many are not aware of. Even heavy-duty and wide gap sensors will have some detection gaps. It pays to know where they are and be able to avoid them. You might want to check out a company called Quick-switch (www.quick-switch.com) and its OH door switch.

If you take a close look at Diagram 1, you will notice that the distance between an approaching magnet that activates a reed sensor and the retreating distance are not the same. The retreating distance is slightly longer. This distance differential is called *hysteresis*. An installer should be especially aware of this phenomenon and avoid installing in the marginal hysteresis area as it can lead to false alarms.

These areas of influence and levels of hysteresis will vary by manufacturer's reed assemblies and magnet/sensor orientation. End-to-end recessed mount contact orientations typically have a little more hysteresis than parallel surface-mount orientations.

Switches Must Be Small, Mighty

Alarm contact packaging is a true manufacturing science. The challenge, especially with recessed contact assemblies, is to make the assembly as small as possible but with the most installation flexibility. On the other hand, the sealed, glass-enclosed reed switch assembly is very delicate. A well-designed alarm contact enclosure will provide extra protection against damage from handling, installation and operation.

This is where the alarm contact gets no respect. How many times have you seen an installer take the heel of his or her screwdriver and give a recess alarm contact a few firm taps in order to get it flushly seated in new construction wooden framing? This can crack and permanently damage the contact's sensor glass seal, which can lead to an immediate contact failure, often a short or no alarm. More commonly, the cracked enclosure will cause intermittent headaches down the road.

Additionally, new construction wood is often green and will swell, creating additional, damaging pressure on a tightly mounted, recessed alarm contact.

Designs, Methods Avert Failure

Installers can do several things to avoid alarm contact failure. One of the best choices is picking the correct contact design for the installation.

Several manufacturers have novel designs for recessed contacts (see *photo below*). The floating wing-type design of the GE Contact Sensor 1275 (www.ge-interlogix.com) allows for the recessed alarm contact to be held in a suspended position in the drilled hole. This design compensates for a slightly out-of-spec mounting hole or compression from new wood. It also makes for easy replacement (you did leave a service loop didn't you?).

Another technique is to protect the alarm loop from any strong electrical surges such as lightning. Remember that even a remote lightning surge will try to find ground, possibly through part of the alarm system. If any part of the alarm circuit is near a ground source, a lightning surge may go through the reed

alarm contacts. Most of the time, they will be either totally or partially welded shut, resulting in a closed alarm contact and a possible alarm "miss" down the road.

Manufacturers such as G.R.I. (www.grisk.com) make in-line alarm loop surge protection devices, such as its CS series, a good option to offer your customers before the surge.

Most Reed Switches Are Reliable

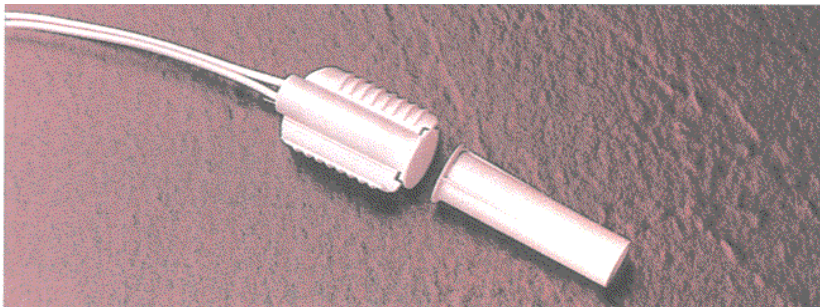
Alarm contact reed switches are, for the most part, well designed. The stirface of the contacts reed is often covered with a special coating like Rhodium or Ruthenim, which helps to reduce possible contact sticking. Have you ever found a stuck alarm contact that opened up after a few taps? If so, it is probably damaged from a surge and I would consider replacing it.

According to Tab Hauser, vice president of Tane Alarm Products (www.tanealarm.com) in New Hyde Park, N. Y.. "A big myth with magnetic contacts is that, if the reed is closed for years and not opened, the reed will magnetize shut. This is highly unlikely. In fact, we say it is impossible if you are using a high quality reed switch in your contact."

Use Switching Wattage to Find Load

The question often comes up, "How much current can an alarm contact handle?" Rather than looking separately at the volts or amps. I suggest looking at the *switching wattage* when estimating a reed switch's load. Typical maximum parameters of an alarm contact would be 200V, 50mA, or 10W Remember my previous "Tech Talk" on Ohms Law and the power formula $P = JE$ (see page 26 of the November 2002 issue).

You can vary either voltage or current as long as you do not exceed the 10W. Don't forget a filter if you decide to use an alarm type contact for switching a device, such as inductive loads, or you will quickly arc and pit the reed's contacts. .



This special recessed alarm contact, sometimes called a "wing-fit" contact, allows for flexible installation options.