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Industrial Manufacturing and Robotics: The Benefits of Designing in Reed Switches, Relays, and Sensors

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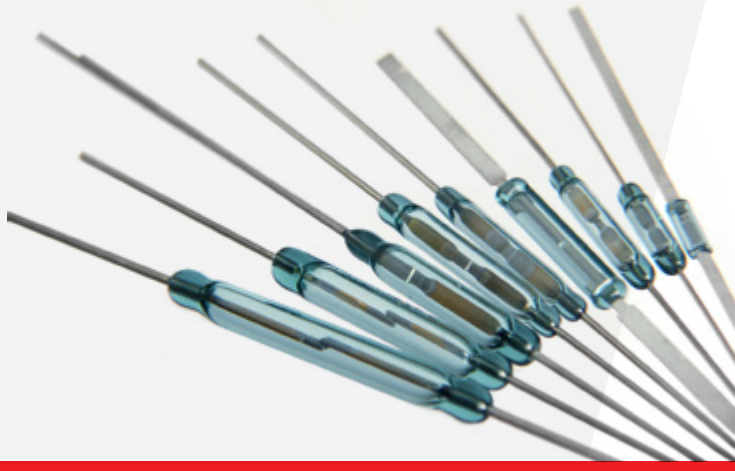

The use of robotics and automation is growing at a rapid pace in the industrial space. The new world robotics report, generated by the International Federation of Robotics (IFR), shows an all-time high of 517,385 new industrial robots installed in 2021 in factories around the world. This represents a growth rate of 31% year-on-year and exceeds the pre-pandemic record of robot installation in 2018 by 22%. Today, there are about 3.5 million operational robots around the globe, a new record per IFR's study. With this rapid rise of industrial robots (Figure 1), the use of reed relays, switches, and sensors is also growing rapidly in the robotics world, primarily in the industrial automation arena. Reed relays and switches are ideal for these applications because of their speed, high reliability, long operational life (>109 operations), and the ability to switch an assortment of AC and DC loads with various signal strengths. In addition, the reed switches and relays are free from mechanical wear and are hermetically sealed, ensuring years of reliable service within demanding environments.

Figure 1 Rapid adoption of robots in industrial applications. *Source: Standex Electronics.*

Equally important is the ability to switch analog signals having micro-volt or pico-ampere signal levels. Here, the low stable contact resistance of the switch or relay offers an ideal solution without losing signal strength over life. Also, if RF is used in the circuitry, the reed relay offers very low insertion loss and very good isolation well beyond 1 GHz. All this performance comes at low cost, making these components attractive and essential for the factory floors of industrial manufacturing and automation around the world.

More Benefits of Reed Switches, Relays, and Sensors

Because reed switches and relays are hermetically sealed (Figure 2), they can operate in harsh environments, such as moist and/or dusty conditions, active liquid and gas media, and across a wide range of temperatures varying from -60°C to +155°C. Additionally, they are immune to radiation, and offer total galvanic isolation of the load and control circuits.

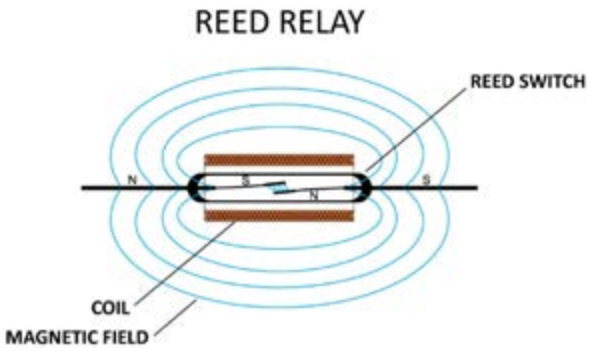

Figure 2 A reed relay is a small electromagnetic switching device that integrates a coil around one or more reed switches. The energized coil creates the magnetic field used to control the switching operation. *Source: Standex Electronics*

Other salient features include low control power (50-200 mW), low resistance (0.05-0.15 Ω), high insulation resistance (10^{10}-10^{12} Ω), fast operating speed (0.5-1.5 ms), long life expectancy at high reliability (>10^8 switching cycles), high mechanical stability (shocks up to 500 g), and vibration in the frequency range up to 3000 Hz at 15-20 G). Furthermore, reed switches can work with a variety of voltages, loads and frequencies, as the switch functions simply as a connected or disconnected wire.

By comparison to Hall-effect sensors, reed sensors offer several advantages. Key benefits include low cost, high isolation, hermetically sealed, low contact resistance, switching power, high magnetic sensitivity, high voltage capability, high current carrying ability, high shock resistance, long life expectancy, wide operating temperature range, and no external power required.

Reed switches also offer a high degree of design flexibility, as they can be used either alone or as part of a more specialized circuit. In comparison to other technologies, reed relays require relatively little power to operate and are more durable, readily switching billions of operations.

Industrial Applications

Essentially, reed switches, relays, and sensors are adopted in a broad range of applications and markets, including transportation, appliance, HVAC and plumbing, security, offices and breakrooms, and many others associated with the industrial sector. Some of them include:

- Door and window open/closed indicators
- Robotic arm movements (pick and place)
- Visual indications (alarms)
- Pneumatic cylinders
- Liquid flow and level monitoring
- Inventory management systems
- Machinery ignition systems
- Counting systems
- Remote alarms, PLCs and SCADA systems

Reed switches, relays, and sensors play an important role within all these applications that need a high-performance on/off, open/close, power transfer, lighting, starting, measuring, or detecting switch.

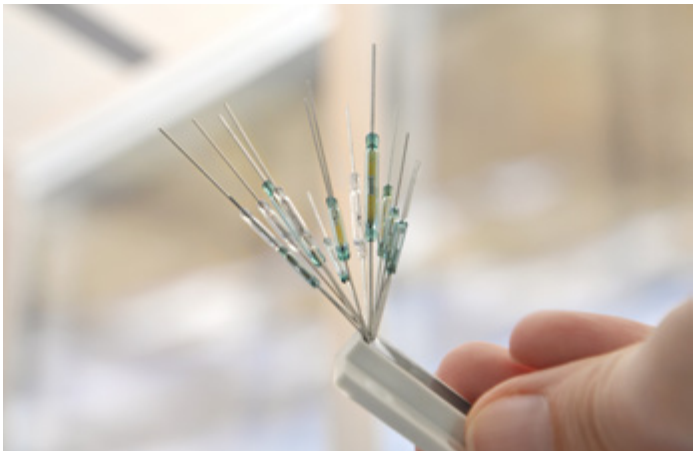

Figure 3 Reed sensors and switches are available in hundreds of sizes and shapes. *Source: Standex Electronics.*

As new, improved technologies create the demand for more sensing applications, it's time for a switching solution that makes sense. For product longevity, power efficiency, and unique needs, reed switches and sensors are available in hundreds of sizes and shapes (Figure 3). They are crucial in dozens of industries and equipped to survive billions of operations in even the most extreme environments. Reed switches and sensors can outmatch and outlast many of their competitors. They continue to grow in popularity as the core component in industrial applications across the globe. Some key applications in the industrial space include:

- Barcode Scanner
- End Position Control
- Explosive Proof
- Harsh Liquid
- High Voltage
- Hot Fluid Multi Level
- Smart Industrial Applications
- Smart City

Take, for example, the electronic barcode scanner. It is found in most grocery stores and retail chains around the world to process purchased items at checkout. Most of these barcode scanners are equipped with a hands-free docking cradle. A reed sensor and magnet used in tandem, with the hand-held barcode scanner and docking cradle, allows hands-free scanning mode with reliable results. In fact, several of the reed sensors offered by Standex Electronics were tested in authentic hand-held barcode scanners, in which they were dropped repeatedly from a height of 4 feet in all six axes, at various temperatures, with no failures and no significant changes to any of their specifications (Figure 4). Failures were reported in other types of sensors tested alongside the Standex Electronics reed sensors. A full report is available upon request.

Figure 4 Electronic barcode scanner drop test axes.

Similarly, the company has crafted reed sensors to precisely and reliably detect the end limit positions of pistons and cylinders in hydraulic systems, and switch active loads in dusty and explosive atmospheres. The list goes on and reed contacts represent a real switching solution with their hermetically sealed contacts.

Reliable and Dependable Source

Component failure in industrial environments means downtime, lost production, and lost revenue. Taking these factors into consideration, manufacturers are looking for suppliers they can rely on. Standex Electronics is one such versatile components maker who can provide not only electronic components, but also ideas, engineering expertise and assistance. As a manufacturer with a global footprint, Standex offers worldwide sourcing and manufacturing capabilities. This translates into cost effective procurement, manufacturing, and logistics depending on the needs of the customer. Standex is fully capable of providing individual components, as well as integrated sub-assemblies and assemblies.

Serving this wide array of applications spread across multiple functions requires a reliable source with a capacity and a reputation, which includes knowledge and experience. There is no one-size-fits-all solution when it comes to selecting reed switches, relays, and sensors. In short, selecting the right reed switch, relay, or sensor for the industrial and robotics applications is not a trivial task. Only an experienced engineer with knowledge of the products can select and guide you through this maze of products.

While there are several suppliers serving this market, there is only one that stands out as a leader. With over 50 years of experience, Standex Electronics is the world's largest manufacturer of reed switches (>700M/year), with >50% market share, and offering the most comprehensive listing of reed switches, relays, and sensors that cover the majority of low power switching requirements. In fact, it offers a broad portfolio that includes magnetic reed switches, reed relays, and reed sensors.

For applications that need a custom solution, Standex Electronics has the capability and experience to deliver a custom product that is optimized for a customer's specific and unique requirements. While there are several examples and case studies that support this capability, the company has demonstrated UL, CSA and ETL rated components for many industrial or commercial applications. The company's engineers work closely with this customer to design and manufacture reed switches, relays, and sensing devices, as well as magnetic trip coils, power transformers, voltage transformers, and multi-tap transformers. Its design engineers often think 'out of the box' to develop custom solutions.

A good example is industrial power systems, where large amounts of power are used in a wide variety of systems. Here, Standex played a key role in providing outsourced engineering and production services for planar magnetics components. Standex engineers leveraged their expertise in power electronics and safety compliance to redesign legacy components with a new material system, which could then be produced at scale while complying with industry-standard safety constraints. Its vertically integrated process assured the end customer could continue producing their products at scale while still complying with UL standards — something which can be challenging when working with an outsourced contract manufacturer.

Summary

With a broad portfolio of reed switches, relays, and sensors, and over 50 years of experience in designing and producing these products, Standex Electronics is a one-stop shop for any company, small or big, that is looking for the best, most reliable, and cost-effective solution to their problems. Standex Electronics is the preferred worldwide source for reed switch technology. Think of Standex Electronics as your partner in solving your problem.

Most assemblies are also UL recognized and RoHS/REACH compliant. With the company's in-house development and manufacturing capabilities, custom reed switch developments of any sized quantity may be accommodated, with production lead times as short as ten business days.

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