Standex DETECT Electronics

APPLICATION ALLEY

Reed Switch & Sensor Technology for Medical Applications



INNOVATE | CONSULT | ENGINEER | DELIVER



Reed Switch Features

- Ability to switch up to 10,000 Volts
- Ability to switch currents up to 5 Amps
- Ability to switch or carry as low as 10 nano-Volts without signal loss
- Ability to switch or carry as low as 1 femtoAmp without signal loss
- Ability to switch or carry up to 7 GigaHz with minimal signal loss
- Isolation across the contacts up to 10^{15} W
- Contact resistance (on resistance) typical 50 milliOhms (mW)
- In its off state it requires no power or circuitry
- Ability to offer a latching feature
- Operate time in the 100 ms to 300 ms range
- Ability to operate over extreme temperature ranges from –55 °C to +200 °C
- Ability to operate in all types of environments including air, water, vacuum, oil, fuels, and dust-laden atmospheres
- Ability to withstand shocks up to 200 Gs
- Ability to withstand vibration environments of 50 Hz to 2000 Hz at up to 30 g
- Long life. With no wearing parts, load switching under 5 Volts at 10 mA, will operate well into the billions of operations
- No power consumption, ideal for portable and battery-powered devices
- No switching noise



In medical settings, it's equally important for portable and implantable devices to utilize an ultra-miniature switch that consumes the least amount of power.

Reed Relays are used in many types of medical equipment that require high current and/or high voltage. Equipment such as electrosurgical generators requires a high voltage relay to aid in regulating the right amount of current used to cauterize vessels during surgery.

Over the years, the Reed Switch has shrunk in size from approximately 50 mm (2 inches) to 3.9 mm (0.15 inches). These smaller sizes have opened up many more applications, particularly in RF and fast time domain requirements.

Without question, the Reed Switch's hermeticity lends itself to more switching applications than any other switching device. Its ability to be used as a complete sensing component by itself or the ease of packaging it into special sensing requirements is done without any complicated process or high tooling costs.

There are so many existing and potential applications for Reed Sensors that it would be impossible to discuss them all here. However, we will cover some of the basic medical applications that we hope will give insight and new considerations for your present and future projects.

Medical

- Portable Defibrillators
- Detecting Sponges And Wipes After Surgery
- Hearing Aids
- Medical Mobility Equipment
- Hospital Beds
- Ideal For Applications Sensing Any Kind Of End Movement Even In Dirty Or Wet Environments
- Lift Chair Position
- Mobility Scooter
- Patient Lift
- Power Wheelchair
- Stair Lift Position
- Wheelchair Ramp Position
- Electronic Scalpels

Portable Defibrillators

Every year, thousands of lives are saved by using portable defibrillators if the heart stops beating. They are battery operated, so the electronics chosen to run the charging circuit must use low-average power. Standex Detects' special BE series design is a two pole normally open relay that has a special spacing between the switches and coil to maintain a long path length, thereby ensuring a guaranteed high isolation voltage between the coil and the switches.

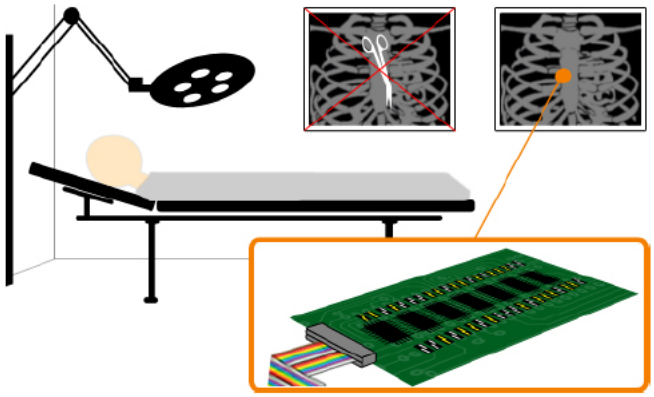


Figure 3. High frequency reed relay detects the presence of surgical instrument.

The design uses no internal solder joints on the Reed Switches to ensure switching reliability. The Reed Switches are selected to withstand 4000 Volts minimum across the open contacts. The contacts can switch up to 1000 volts as well.

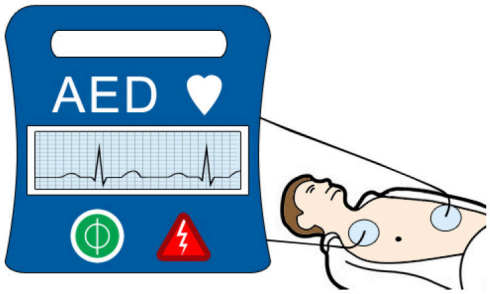


Figure 1. Defibrillator with reed relay shown shocking patient with no heart rhythm.

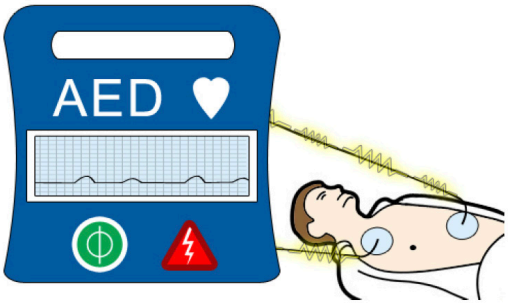


Figure 2. Defibrillator with reed relay has restored normal heartbeat with no harm to the patient.

Operating Rooms Use Reed Relays to Eliminate Instruments Left Behind After Surgery

Most malpractice suits involve medical procedures or operations where a problem occurs during surgery. Since blood is ever abundant during surgery, it can obscure the area being worked on.

Medical electronic designers have come up with a clever way of detecting sponges potentially left behind in conjunction with using Standex CRF Reed Relays. after the operation, but just before closure of the wound, an external electronic transmitter is turned on. Using a matrix of relays, it scans the body for these items.

If any are left behind in the incision, they're quickly found and removed.

In-The-Canal Hearing Aids Use Reed Sensors

New high-tech, miniaturized hearing aids have been made possible by the fact that less sound amplification is necessary due to their position closer to the eardrum.

Remote activation, offered by the micro Reed Sensor, was an essential ingredient for in-the-canal hearing aids. Reed Switches initiate the setting of the various modes and volume controls so vitally needed.

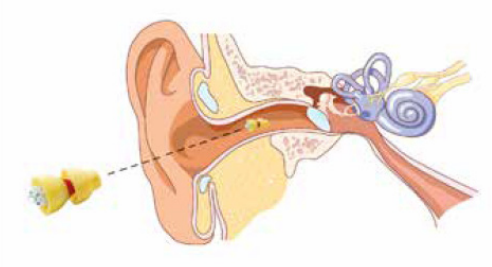


Figure 4. Completely In-the-canal hearing aid with integrated micro reed sensor.

Detect End Limit Position On Hospital Beds And Mobility Equipment Using Reed Sensors

Hospital beds, motorized chairs, special lifts for bath tubs, massage chairs, etc., require end position detection. Since the consumer uses these, care needs to be taken to use low-power switching devices, eliminating the threat of electrical shock to the user. Now designers have turned to the Reed Sensor, which uses hermetically sealed Reed Switches, for reliably switching low signal levels.

The magnet is usually mounted to the movement mechanism and the Reed Sensor is mounted at the end position detection point. When the mechanism and magnet are moved and approach the Reed Sensor, the reed contacts will close sending a signal to the electronics, which in turn halts the motion. In this way, reliable operation is achieved.

It is also easily accomplished to sense several positions in a given motion and not only the end movement. Reed Sensors can be strategically placed at all interested sensing points to carry out this operation.



For When it Matters - The Right Design, at the Right Time, at the Optimal Cost.

At Standex Electronics, we believe in: Collaborative innovation with our customers

- Collaborative innovation with our customers
- Delivering the right design, at the right time, at the optimal cost
- Acting as an extension of your engineering team
- Living our promise: **Innovate | Consult | Engineer | Deliver** — when the stakes are high, Standex Detect delivers

To learn more about how Standex Detect can support your projects with innovative sensing, switching, and relay technologies, visit standexdetect.com or contact our engineering team to discuss your specific application needs.

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