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Reed Technology



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Reed Switch and Reed Sensor Applications

Introduction

Reading the previous sections on the Reed Switch basics, key parameters, and operational characteristics before delving into this section will give one a better background and more insight into developing requirements for your own applications.

Without question, the Reed Switches' 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. We will however, cover some of the basic applications which we hope, will give insight and help to your application. Once you review this section and some of the sensor specifications offered in this book, please feel free to call our applications department, where qualified engineers will be able to answer questions pertaining to your application. Free samples are always available as well.

Obviously if your application requires one of our standard sensors from our catalog, that is clearly the best approach and the quickest solution to satisfying your design requirement. However, more than half of our shipped sensors are from special requirements. Since many sensing requirements are unique, working with customers on their special applications is expected.

Using the Reed Switch by itself can seem like the simplest approach. However, without proper consideration and precaution it could become disastrous. If you decide to go this route, be sure to read our precautions section. Most important to keep in mind, the Reed Switch is a glass capsule and is susceptible to breakage. Observing this, and properly mounting the switch in a stress free environment, will prove to be a winning combination. If you do have failures or erratic operation, please discuss your

problem with our applications engineering. Many times we have taken over the application and manufactured the entire sensor thereby producing a fault free sensor. In the end, it would have been less expensive having us design and manufacture the entire sensor from the beginning. Keeping this in mind, we really are open to working with you on your application in either manner.

Reed Switch Selection

Initially the most important step is the proper selection of the correct Reed Switch for a given application. If the sensor is simply switching the gate of a transistor or digital gate any Reed Switch will handle that requirement. The question then becomes one of size and cost. Looking through our Reed Switch selection chart will help you arrive at the best choice. If you are switching a load, 'hot' switching a voltage at some current level, care must be taken to select the proper wattage Reed Switch with the corresponding required voltage and current level. Sensors requiring long life times (10's of millions of operations) will need special attention to the load you are switching. If you are switching 5 Volts @10 mA or less you will not have a life problem; above this level care must be taken. Talking with our applications engineers and reviewing our life testing section will be helpful.

Reed Sensor Packaging

Usually packaging is the safest approach when developing a Reed Sensor. Carefully protecting the glass to metal seal from potential damage or stress will result in a fault free application. When packaging the Reed Switch, even when it 'looks' fine, stress may have been induced through bending, cutting, soldering, welding, potting, or encapsulating the Reed Switch, with erratic behavior resulting. Packaging the Reed Switch without inducing any stress is critical to proper operation and long life, whether it is packaged by the user or by the Reed Switch Sensor manufacturer. Collaboration on the application, between the user and the Sensor manufacturer must be carried out in a detailed fashion.

Using our Reed Switch Sensor selector guide will give the user some ideas as to packaging styles and sizes. Special packages with specific connectors or connections are very much a norm. So do not hesitate, to offer your special packaging requirement. Our special packages are far too numerous to show in our Data Book. When determining the closure and opening distance care must be taken to include the distance within the package as part of the sensing distance. Standard packages offered by Standex-Meder will take this distance into consideration in the design. However, on special packages, keep this distance in mind because it does affect sensitivity.

Plastic packages are easiest to tool and are the least expensive. However, if a rugged enclosure is required, use of a non-ferromagnetic material may be the best approach. Be careful not to include any nickel, iron, or cobalt in the package. They will shunt the magnetic field.

Lead lengths and connectors are wide open with hundreds of possibilities for all potential requirements.

Reed Sensor Mounting

Mounting a Reed Sensor is generally quite open with a multitude of options. However, care must be taken not to mount the sensor on any ferro-magnetic material or be within its influence. Keep in mind, magnetic flux lines prefer to travel in ferromagnetic material, which in effect, will have a shunting effect on the magnetic field.

We have shown cases where this effect can be used for positive results in some applications in our operational section, but one must give consideration to magnetic materials in the vicinity of the application. Also, any magnetic components that are also in the vicinity of an application, such as inductors, transformers, toroids, etc. must be given consideration to their influence in the magnetic sensing circuit. Our Reed Sensors come with an assortment of ways in which to be mounted. Many have simple slots for screw hole mounting; some have doubleback sticky tape; some simply screw into panels;

others have pins for PCB through hole mounting; others have surface mount 'J' or 'gull' leads for mounting on SMT boards. Variations of the above are available as well, to meet all your application mounting possibilities.

Reed Switch Electrical Connections

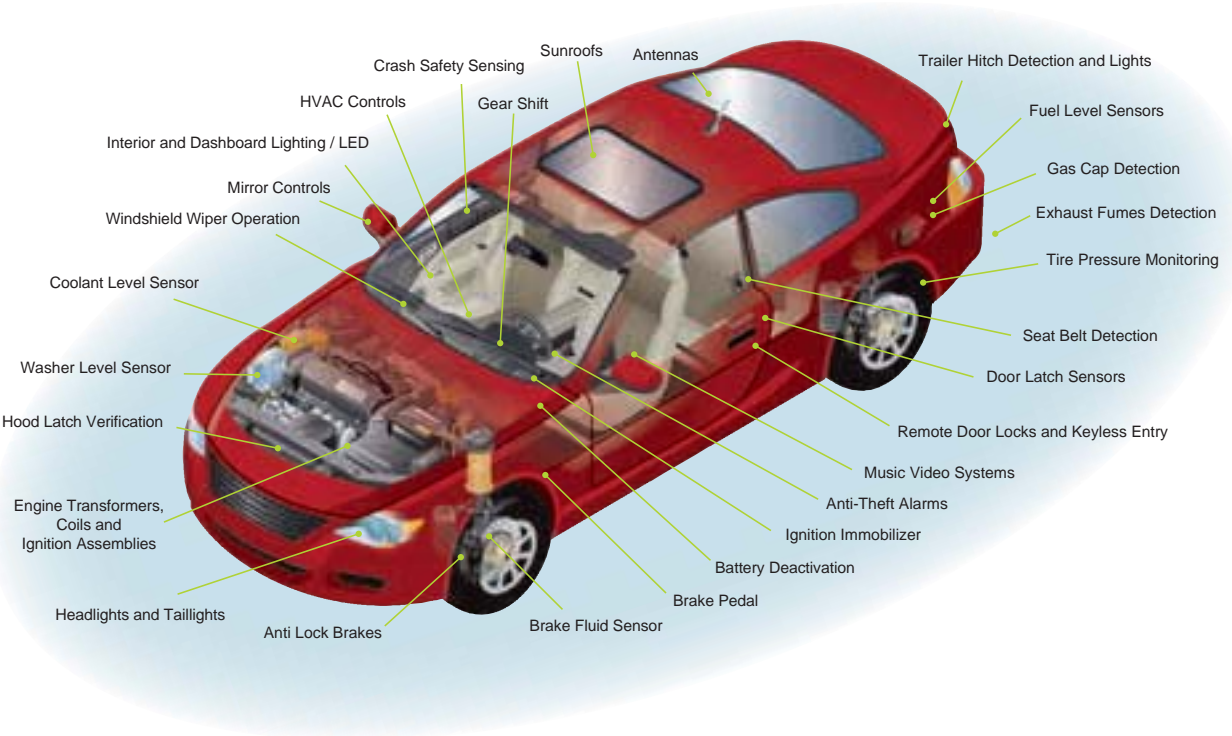
All our Reed Sensors are manufactured with an assortment of ways in which to be electrically connected. Most of the popular ways are PCB mount, leads of varying length for soldering, leads with connectors and surface mount soldering. Some lead wires will have an array of terminals available as options for making the electrical connection. Most of our series offer terminals on the leads for quick solderless connections. Surface mount soldering is becoming increasingly popular. Our MK1, MK15, MK16, and MK17 were all designed with that in mind.

Reed Switch Sensing Applications As stated, the list for different sensing applications is endless. We will make an attempt at presenting some of the more common sensing applications, which we hope will nurture ideas that may offer solutions to your sensing application. Keep in mind, no external power is required in a Reed Sensor application. The Reed Switch in most cases, once closed will switch the load you require.

Automotive & Transportation Market Applications

Standex-Meder Electronics dynamic capabilities and solutions provide reed switches, relays, and sensors, magnetics, and fluid level sensing products throughout the transportation industry. Think of anything that turns on/off, opens/closes, requires power transfer, lighting, starting, measuring, or detecting – and we can play a role within that application.

From read outs on the dashboard to measurement of coolant, brake, windshield, water in fuel, tire pressure, and emissions – our components perform within vital processes within automobiles, heavy-duty trucks, recreational vehicles, airplanes, trains, motorcycles, E-Cars, E-Bikes, boats, and more.

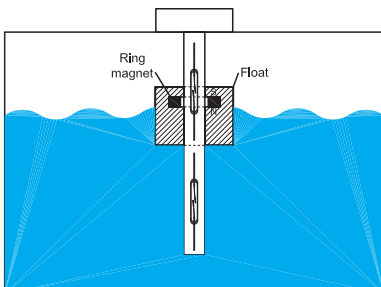


Liquid Level Detection

More and more level sensing of brake fluid, window washer fluid, and water cooling fluids are controlled by Reed Sensors. A float, with a magnet mounted in it, is generally placed in the container. The Reed Switch is placed either inside or under the container for float detection.

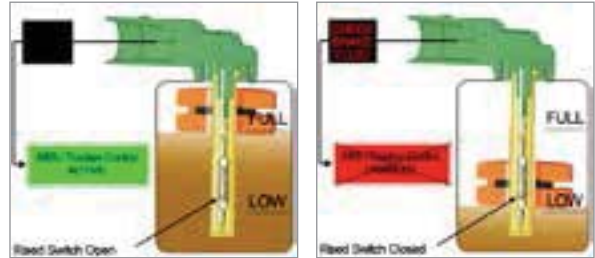
In the past, automotive manufacturers used the Reed Switch in the brake fluid application in the following manner: when the container is full the float opens the Reed Switch. When the liquid level drops, the float goes down and activates the Reed Switch. A lamp is then activated on the dashboard. Nowadays, automotive manufacturers use the Reed Switch in reverse order. When the container is full, the float with the magnet, actuates and closes the Reed Switch. When the level of the float drops, the Reed Switch opens. The change in monitoring the opening instead of the closure has the advantage that a malfunction of the switch can be detected much easier.

If the on-board computer on the automobile can electrically detect a level sensor, then an advanced level sensor can be used. This sensor has more electronic components than a Reed Switch. It is made with a PC board on which a resistor is mounted in series that protects the Reed Switch, and a second resistor is mounted in parallel so that the computer detects that the sensor is connected and in place.

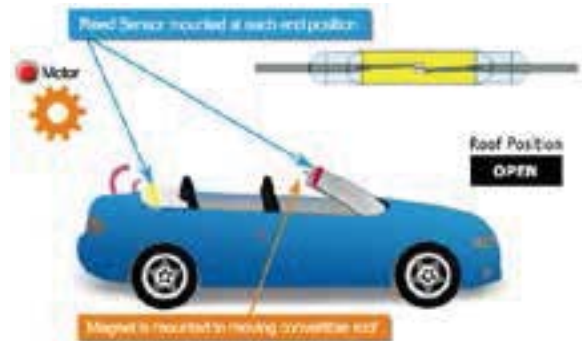


Liquid level sensor applications range from one switch to detect a high or low, to arrays of many to accurately monitor fluid levels.

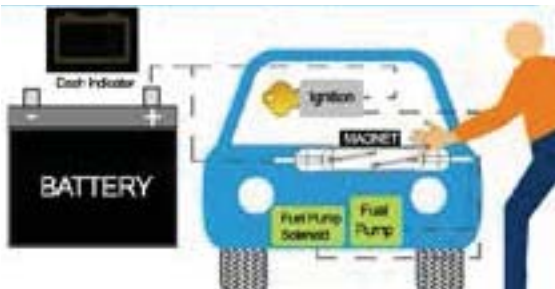
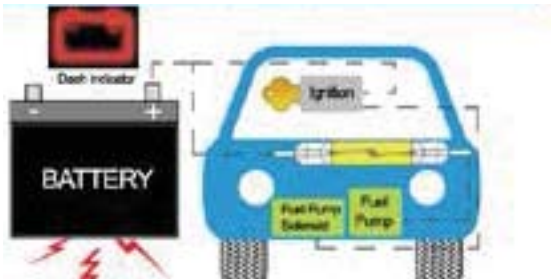
Brake Fluid Detection



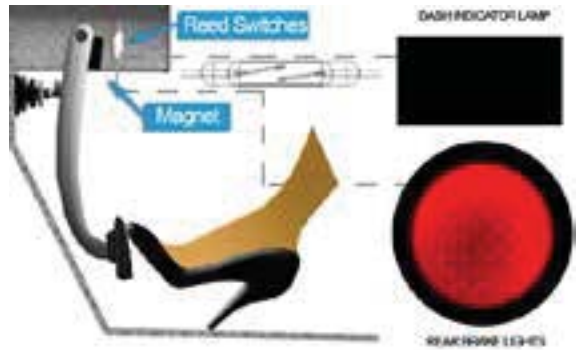
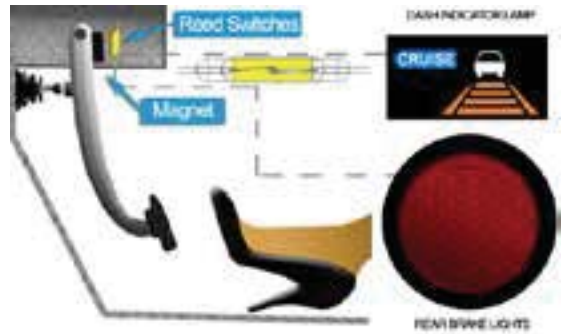
Convertible Roof Position Sensor



Battery deactivation controlled by a Reed Sensor

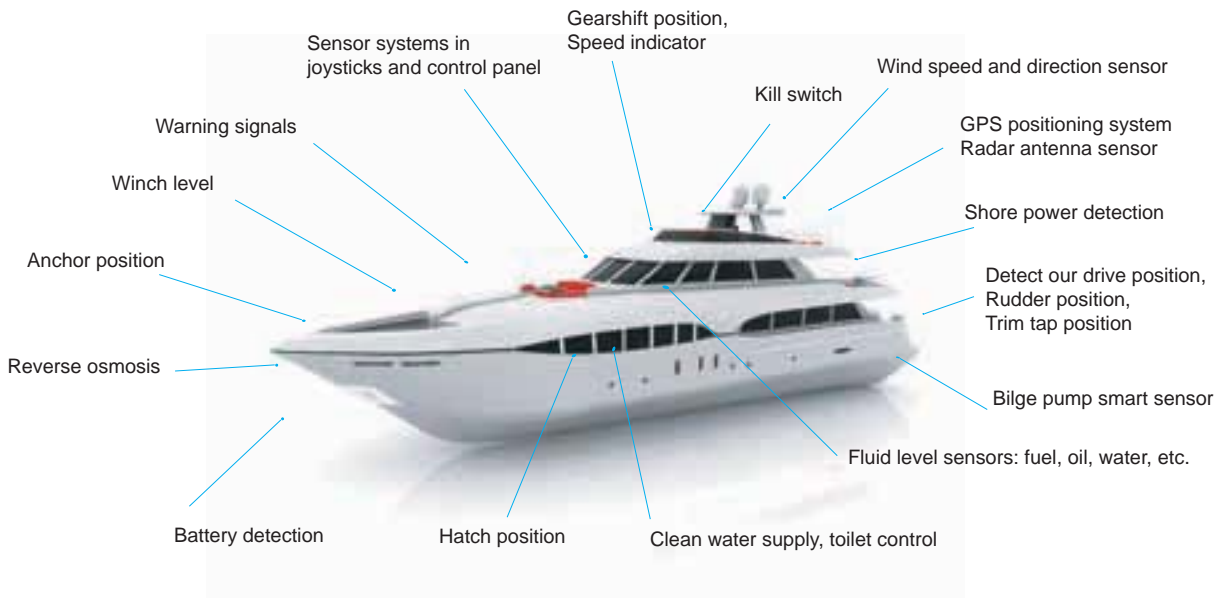


Brake pedal position



Marine and Boat Applications

Similar to automotive applications, Reed Sensors are used in marine and boat applications for level sensing and position detection.



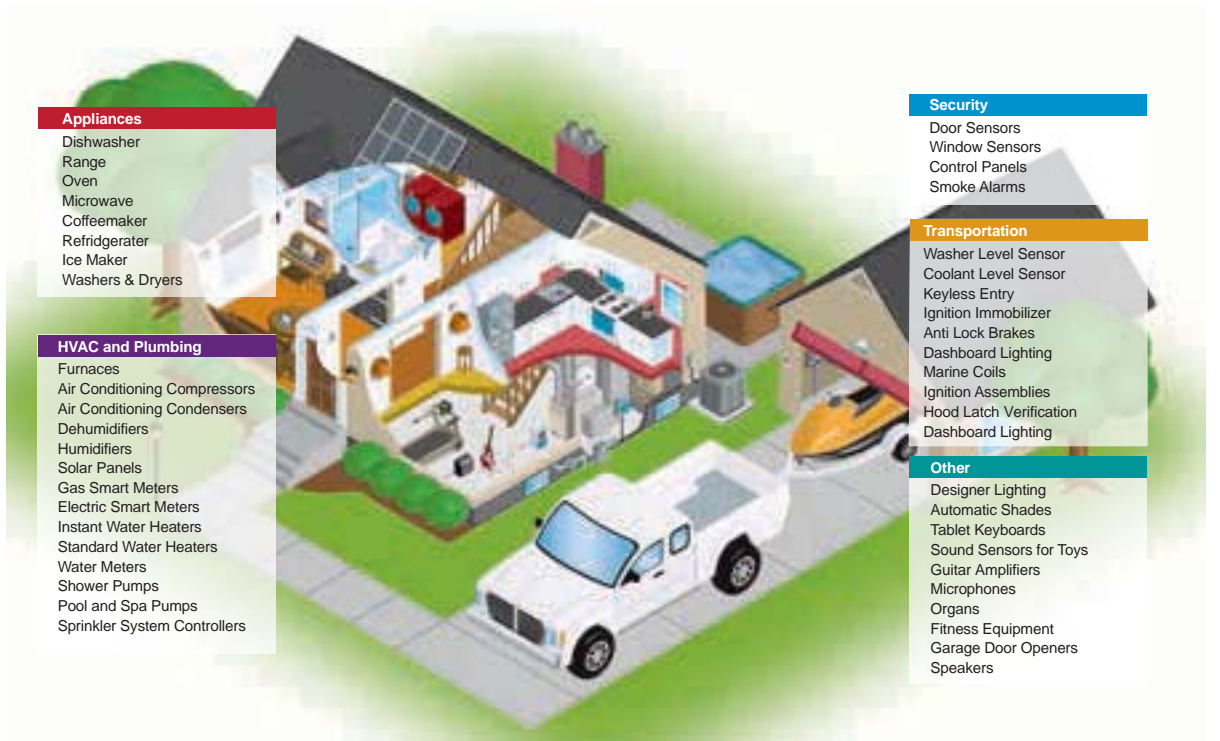
Smart Bilge Pump Sensor



Smart Home Applications

Household appliances and electronics feature much higher efficiency and are now being designed in conjunction with smart metering devices. Detecting door position, and monitoring fluid levels are just a few examples

of how reed switch sensors are making their way into household appliances.

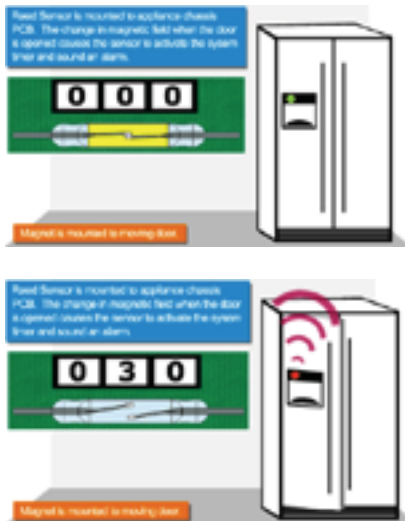


Dishwasher Spray Arm Detection



Security Control for Appliance Door Detection

The white industry of refrigerators, freezers, microwave ovens, stoves, etc. requires safety elements that detect the status (open/closed) of the appliance doors. These door sensors are designed in many sizes and shapes depending upon the specific application. Many are specifi-

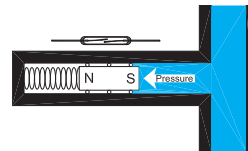


cally designed with special tooling. Generally, both a Reed Switch and a magnet are used, and in many cases, added circuitry is built into a PCB for smart sensing. If the sensor does not activate after a specified period of time, an alarm will sound, alerting one that the door is ajar. In the case of a freezer, several hundred dollars in frozen meats and other foods can be saved from spoilage if an open door is detected. The Reed Sensor is usually mounted in the chassis of the appliance and the permanent magnet is placed in the door-frame. Thus, when the door is closed, the magnet's position is above or parallel to the sensor. When someone opens the door, the circuit is broken.

Water Flow Sensor

In this application, the sensor recognizes the movement of water. The Reed Switch, in going from an open to a closed state, produces a fast response to the initiation of water flow; in turn, an action sequence is initiated.

Applications such as electric water heaters, air conditioners, etc. represent some examples. A baffle plate with a magnet mounted to it is used in the water flow line. When water begins to flow, the baffle plate moves parallel to the water flow. A Reed Switch is strategically positioned to pick up, or sense, this movement, and once the magnetic field is sensed, the Reed Switch closes. In the case of a water heater, it instantly detects the water flow, and in turn triggers the heating element to be turned on. The alternative method of detecting the temperature change when cold water is added into the tank can take

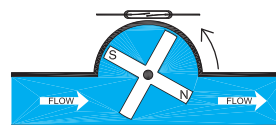


Pressure sensor, can be calibrated for precise pressure points

a much longer time for detection, resulting in the loss of valuable heating time, particularly when high water usage is involved

Measuring the Quantity of a Liquid or Gas

Water or fluid flow can be easily measured by mounting a propeller just outside the water pipe and connecting it underneath the plastic casing of the meter. The water flows through the pipe and spins the propeller. A mag-



Liquid or gas flow sensor can be used to measure flow speed or volume

net is mounted on the propeller and a Reed Sensor is mounted outside of the plastic casing. In this case, each propeller rotation is counted as the magnet rotates past the Reed Sensor. The rotations are tallied and electronic circuitry converts the rotations to volumes of water (or other liquid) flowing through the pipes. In a similar manner, the flow of gas and electricity can also be measured. Our MK3 Sensor is often used for such applications, but we have many other sizes and shapes also worthy of your consideration.

- Copier position sensors
- Electric toothbrush
- Hotel security card reader
- Hot Tubs & Spas
- Interlocking
- Keyboards
- Laptop closure sensing
- Massage chair
- Printer sensors
- Water flow sensor
- Utility meter sensors

Consumer electronics



Sensors and switches make their way into many types of consumer electronics. Just about any application involving movement or the need to switch something on and off. A proximity sensor used in a cell phone or digital camera has a switch housed in the device and a permanent magnet positioned within the moving screen. Once the screen is rotated or slid to one side the magnet lines up with the switch contacts causing the screen to activate the phone or camera.

Another use for a reed sensor in a cell phone is when the phone is used with a docking station. When the phone is placed into the docking station, the magnet activates the switch causing the phone to go into hands-free mode or switches into car mode for the use of a global positioning system GPS.

Applications

- Barcode Scanner
- Camera screen activation
- Cell phone screen activation
- Chair lift

Hobby & Toy

Today's toys are being designed with more and more moving parts requiring simple, reliable and inexpensive sensing solutions. Our magnetic reed sensors are a perfect fit in countless toy sensor applications.

For example: a baby doll that drinks a bottle may have a reed sensor positioned beneath the mouth and a permanent magnet molded into the bottle and when the bottle is held up to the it's mouth, the baby makes a drinking sound or stops crying.

Applications

- Car race track
- Baby doll position sensor
- Electronic board game position sensor
- Mechanical movement sensing
- Model train
- Video game peripherals



Safety and Security



Fire and Safety doors in public buildings, hospitals, government buildings, hotels and other buildings regularly frequented by people, require the doors to be shut at all times except in an emergency. By law, the doors must be electronically controlled; if they are opened, proper warnings must be given.

The topic of security gets more and more important – and Standex-Meder has the solutions for a lot of applications.

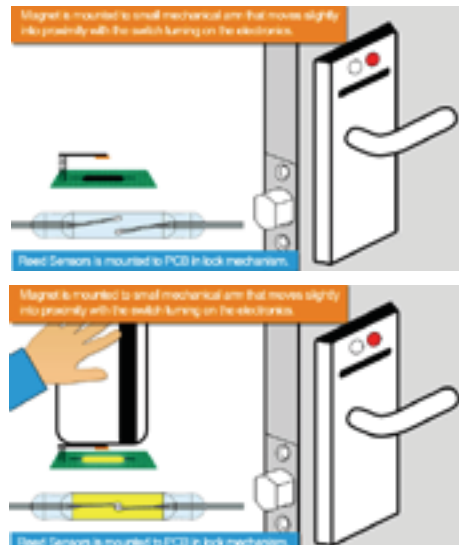
Safety Applications

- Passive infrared detectors
- Smoke and fire alarms
- Dial-up modems
- Ultrasonic detectors
- Cargo & freight theft prevention
- Door sensor
- Emergency door sensor
- Explosive Proof
- Fire extinguisher
- Hotel security
- Position sensor
- Vehicle restraint
- Window sensor

Door Sensor for Fire, Safety & Emergency Exit



Hotel Security



Medical



In portable and implantable devices it is equally important to utilize a switch that is ultra miniature and one that consumes the least amount of power. Reed switches and sensors consume no power in their normally open state. Reed Relays are used in many types of medical equipment that require high current and/or high voltage. Equipment such as an electrosurgical generator requires a high voltage relay to aid in regulating the right amount of current used to cauterize vessels during surgery. Similar equipment may use RF energy combined with saline to seal off vessels therefore high frequency relays would provide a better solution.

Medical Applications

- Camera pill
- Handheld surgical tools
- Glucose monitor
- Hearing aid
- Implantable cardioverter defibrillator ICD
- Orthopedic micro power instruments
- Pacemaker
- Portable defibrillators
- Surgical Instruments
- Spine stimulator implant
- Video camera pill
- Hospital bed
- Lift chair position
- Mobility scooter
- Patient lift
- Power wheelchair
- Stair lift position
- Wheelchair ramp position
- Cleaning equipment
- Drug dispensing systems
- Electrosurgical generators
- EKG equipment
- Insulin pumps
- Intravenous pumps



Portable medical equipment - Defibrillator



Test and Measurement



Test and Measurement Applications

- Automated Test Equipment
- Battery powered
- Cable testers
- Chip testers
- Data Acquisition/Scanning Systems
- Electrometer
- Functional PCB testers
- High voltage
- Industrial
- Integrated circuit testers
- Linear distance
- Medical equipment testers
- Modular Instrumentation
- Multimeters
- Network Analyzers
- Oscilloscopes
- RF Attenuators
- TVS Tester
- Wafer testers
- Weather meters

With the ever increasing requirements for electronics and electronic systems, the need exists to be able make voltage and current measurements covering several orders of magnitude. From nano-volts to kilovolts and from fempto-amps to amps. To do this with one instrument is almost impossible; however, multimeter designers have been able to expand the order of magnitude of these measurements in recent years. To be able to do this, the reed relay has become an essential component. Our specialized reed relays have helped designers meet this challenge.



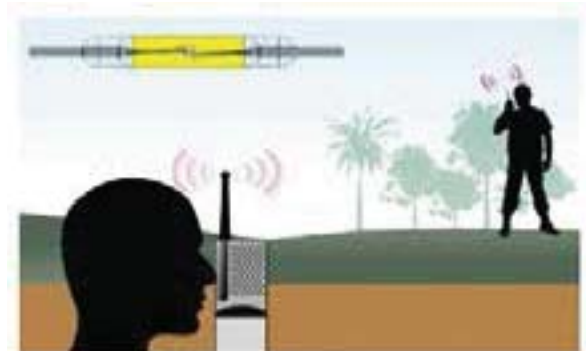
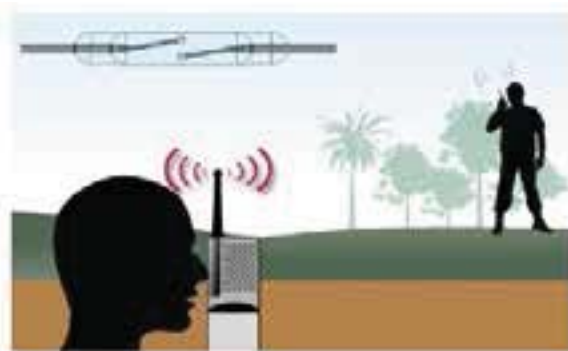
High End Multimeters Use Reed Relays to Measure Low & High Voltages

Telecommunication

The hermetically sealed Reed Switches can switch low signals, which are required for the various applications within the telecommunication sector.

Telecommunication Applications

- Device disabling
- Interlocking
- Mobile phone position sensing
- Off hook sensing
- Switching a cellular phone on/off in a flip phone
- Telephone line switching
- Cellular phone antenna switching
- Line sensing
- Line switching
- Modem switching
- Pager T/R switching
- Portable radios
- RF Receivers
- Test equipment



Reed Relays for portable radios and communication systems

Further Applications

Many more Applications possible...

- Motor rotor sensing
- Thermostats
- Test and measurement equipment
- Rain gauge sensor
- Wind speed and direction sensing
- Barometric sensing
- Inside/outside temperature sensing
- Position sensor for exact window sun-shade control
- Solar panels
- E-Bikes brake detection
- Sensor solutions for agriculture, forestry and construction machinery
- Many more



E-Cars connector detection

Visit us on our website www.standexmeder.com to find an overview of all our applications as animations, including the ones you can find in this book.

