Standex DETECT Electronics

APPLICATION ALLEY

Reed Switch & Sensor Technology for Technology Applications



INNOVATE | CONSULT | ENGINEER | DELIVER





Reed Switch Features:

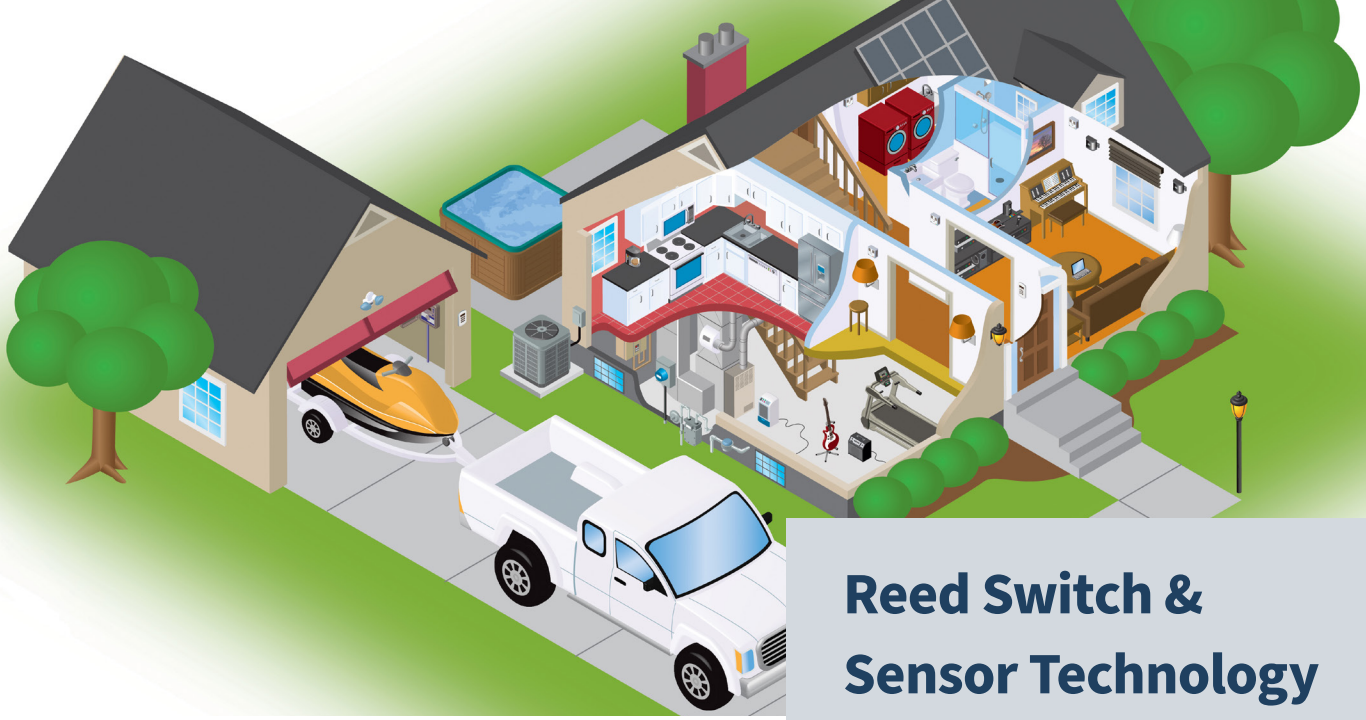
- Ability to switch up to 10,000 Volts
- Ability to switch currents up to 5 Amps
- Ability to switch or carry as low as 10 nano-Volts without signal loss
- Ability to switch or carry as low as 1 femtoAmp without signal loss
- Ability to switch or carry up to 7 GigaHz with minimal signal loss
- Isolation 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

Reed Switches are used in all market segments today, from test and measurement equipment to medical Detect, automotive, household appliances, aero, telecom, consumer Detect, HVACs, general purposes, and much more. Its growth rate is stronger than ever, where the world output cannot stay abreast with demand.

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 applications that we hope will give insight and new considerations for your present and future projects.



Reed Switch & Sensor Technology for Household & Appliance Applications

If you're using a washer, coffee maker, dishwasher, fryer, refrigerator, oven, microwave, or countless other household appliances – chances are Reed Switch technology made it possible.limited space.

Appliances

- Dishwasher
- Range
- Oven
- Microwave
- Coffeemaker
- Refrigerator
- Ice Maker
- Washers & Dryers

Transportation

- Washer Level Sensor
- Coolant Level Sensor

Smart Home Metering

- Keyless Entry
- Ignition Immobilizer
- Electric Meter
- Gas Meter
- Water Meter
- Heat Meter
- Grid Operation

Security

- Door Sensors
- Window Sensors
- Control Panels
- Smoke Alarms

Other

- Designer Lighting
- Automatic Shades
- Pool, Spa & Hot Tub Flow Sensing
- Tablet Keyboards
- Electric Toothbrushes
- Sound Sensors for Toys
- Guitar Amplifiers
- Microphones
- Organs
- Fitness Equipment
- Garage Door Openers
- Speakers

*Note: this list only represents a small sample of potential applications.

Utility Meters - Measuring Water Flow Volume Using Reed Sensors Determine If Filter Needs Replacement

Water filters must measure the amount of water passing through them to know when to change the filter.

Reed Sensors sense each full rotation of the filter's paddle wheel and send that information to an electronic counter to accurately measure the amount of water being filtered.



Coffee, Espresso & Tea Maker Components

In many newer coffee machines, without permanentwater connections for commercial or domestic applications, a low water indicator lamp signals the minimum water level.

The Reed Switch will only open (and thereby turn off the low water light) when the water level has been sufficiently refilled such that the magnetic float is above the minimum water level mark.

Reed Sensors Detect Dishwasher Spray Arm Obstruction

One of the essential actions that take place within the dishwasher is the rotation of the spray arm. If a dish is improperly positioned in the washer blocking the rotation of the spray arm, trouble ensues.

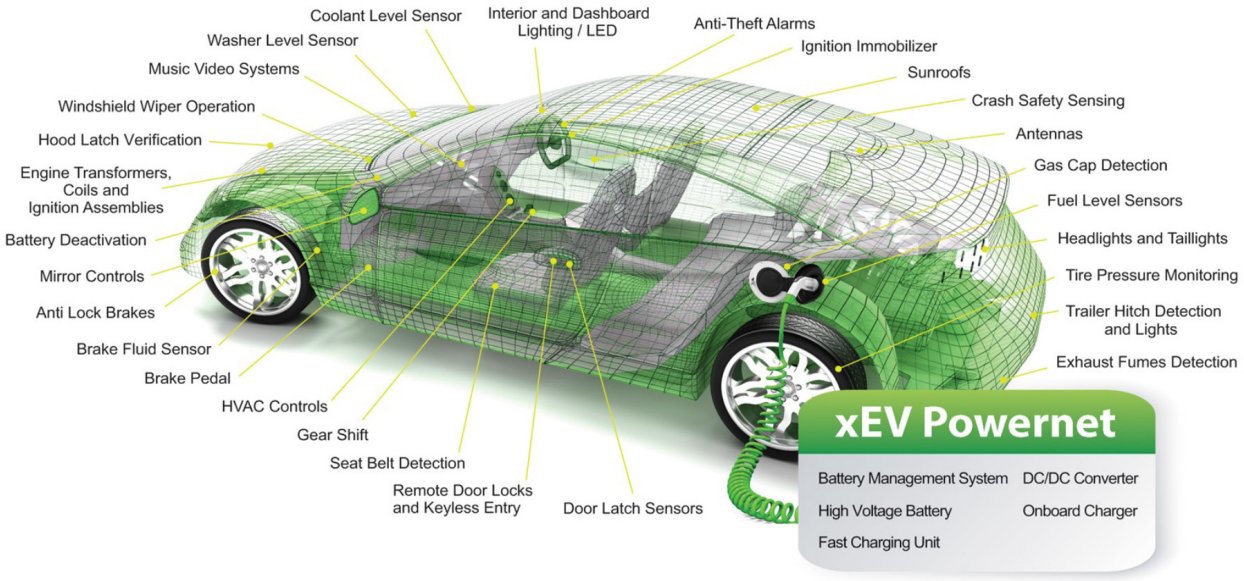
When the spray arm is blocked, the Reed Sensor sends a signal to the Detect that the spray arm is no longer operating. Once the blockage is removed, the dishwasher resets and will resume its normal operation.

Detect and Control Appliance Doors Using A Reed Sensor

Appliances, particularly refrigerators and freezers, must have their doors closed at all times to ensure the freshness of food. Reed Sensors are a simple choice to ensure this.

The Reed Sensor is usually mounted to a PCB on the chassis of the appliance. When the door is closed, the Reed Sensor is activated.

When the door is opened, the contacts open, activating a timer in the Detect. After a specified period, an alarm or beeper will be activated – alerting the user that the door has been left open.



Reed Switch & Sensor Technology for Automotive/EV and Hybrid Applications

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

This ultimately allows end-users the ability to seamlessly open a door, flip a switch, measure fluid levels, track an object, adjust a car thermostat, drive home, or do thousands of other activities.

In electric vehicles, Reed Relays are typically found in the Battery Management System or On Board Charger and can take various forms depending on the developer's needs. In general, the relay is situated between the high-voltage battery and the ground and acts as a separation to isolate the high-voltage circuit of the battery from the low-voltage circuit of the measurement microcontroller unit.

Automotive/EV

- Headlights
- Dashboard Lights
- Glovebox Lighting
- Catalytic Converters
- Brake Pedals
- Convertible Roofs
- Key In Ignition Detection
- Lights On Detection
- Battery Management Systems
- Battery Isolation Systems
- Power Inverters
- Battery Conditioning
- Power Door
- Power Locks
- Truck Gear Shifts
- Sensing and Controlling Fume Exhaust
- Battery Deactivation
- Alarmed Vehicle Hoods
- Gas Tank Lid Monitoring
- RFID/Antennas



LED Capabilities

Using light-emitting diode (LED) lighting instead of common bulbs has opened new doors for Reed Switches and Sensors. LEDs offer lower warranty costs, longer lifespans, and greater efficiency. As LEDs use less power than incandescent bulbs, switching via a Reed Switch also becomes simple. They're capable of switching most interior automotive lighting loads directly and can be directly mounted to a printed circuit board or electrical circuit to make instant electrical transfer.

Reed Sensors Control and Minimize The Exhaust Emissions In Catalytic Converters

To reduce gas emissions, auto designers found that sensing the movement of a valve mounted in the catalytic converter that moves relative to the volume of emissions can feed back information to make adjustments. As the valve shifts its movement, the Reed Sensor will activate, sending a signal back to the onboard computer sensing function. The Reed Sensor is an excellent choice because it can operate reliably from -50˚C to 150˚C and represents an economical way to carry out the sensing function.

Brake Pedal Position Reed Sensor

Practically all motor vehicles have a brake pedal used to slow down or stop, generally located near the floor of the vehicle in one of the dirtiest environments in the cab of the vehicle. Regardless of the harsh environment or space availability, Reed Sensors work very well. The sensors can also be supplied as a single pole normally open and a single pole normally closed. In the second case, when the brake pedal is depressed, the normally closed contact will open, automatically disengaging the cruise control.

Automatic Convertible Roofs Use Reed Sensors to Control The End Points

Many older convertible cars used mechanical hand operation to collapse convertible roofs and to reclose the roof. Today, a magnet's mounted to the convertible roof and Reed Sensors are mounted at the end positions. When the vehicle operator throws the switch to open the roof, a motor is engaged and the roof begins to open or close. This operation will continue until the end position is about to be reached. This is when the Reed Sensor engages, sending a signal to the onboard computer, which sends a command to turn off the motor. The roof comes to rest in its proper position.

Reed Sensor Detects Key In Ignition And Auto Lights Left On

Automakers have cleverly designed a magnet into the door handle. Standex Reed Sensors are strategically placed internally in the door to sense motion. When the Reed Sensor is activated, the onboard computer checks to see if the keys are still in the ignition and if the main lights are still on. If detected, a beeping noise sounds, alerting the driver that something's amiss.



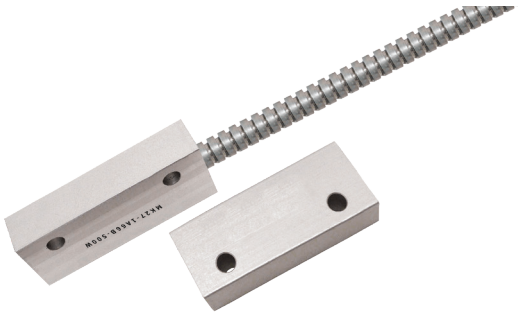
Reed Switch & Sensor Technology For Alternative Energy Applications

The Alternative Energy market has seen a staggering boom over the last ten years, with no signs of slowing down as technology advances.

Reed Switches & Sensors have been a critical aspect of providing reliable, long-lasting Alternative Energy products across the globe. Why? Because they require zero power consumption, offer long life expectancy, and a hermetic seal.







Alternative Energy:

- Wind turbines
- Solar Panels
- E-Bike Brakes
- E-Car Charging





Helping Wind Turbines Remain Energy Efficient, Sustainable & Eco-friendly

- The surface mount Reed Sensors are used for the task of sensing wind turbine rotor speeds.
- In the event of excessive winds, the Reed Sensor signals the turbine rotor to disengage from the power generation mechanism to prevent gear train damage
- Reed Sensors are designed in a robust thermoset over-molded package impervious to extreme temperatures and harsh conditions.
- The Reed Sensor uses a simple magnetic field detection to sense the rotor speed without contact.

E-Bike Brake Detection

Shutting off the electric auxiliary drive motor of an e-bike as soon as the brakes are applied is critical for safety. This improvement uses a Reed Switch Sensor and magnet to detect the movement of the hand brake lever.

The Reed Sensor is positioned in the brake housing while the permanent magnet is fixed in the hydraulic piston. The slightest movement of the brake lever brings the magnet into proximity with the sensor and switches off the engine.

Reed Sensors can carry out other e-bike safety switching functions such as activating the brake light, sensing seat occupancy, etc.

E-Cars Connector Detection

Battery life and charging have been a major focus of electric vehicle (EV) manufacturers in recent years, and Reed Sensors function as a critical tool in ensuring a safe and efficient charging cycle.

To avoid potential electrical accidents and arcs, the current flow between the plug and socket must be continuously monitored. This means tiny sensors must continually check the correct position of the connector into the port and interrupt the power supply should the need arise.

Our switches last for billions of switching operations while remaining unaffected by their environment thanks to their hermetic seal – thus making a significant contribution to the security and the development of electrically driven automobiles.

Reed Sensors can also control further functions, such as an immobilizer, power indicator, locking, etc. amiss.



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

Reed Switch & Sensor Technology for Automotive/EV and Hybrid Applications

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.

Portable Defibrillators

Every year, thousands of lives are saved by using portable defibrillators if the heart stops beating. They are battery operated, so the Detect chosen to run the charging circuit must use low-average power. Standex Detect' 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.

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.

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

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-thecanal hearing aids. Reed Switches initiate the setting of the various modes and volume controls so vitally needed.

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 Detect, 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.



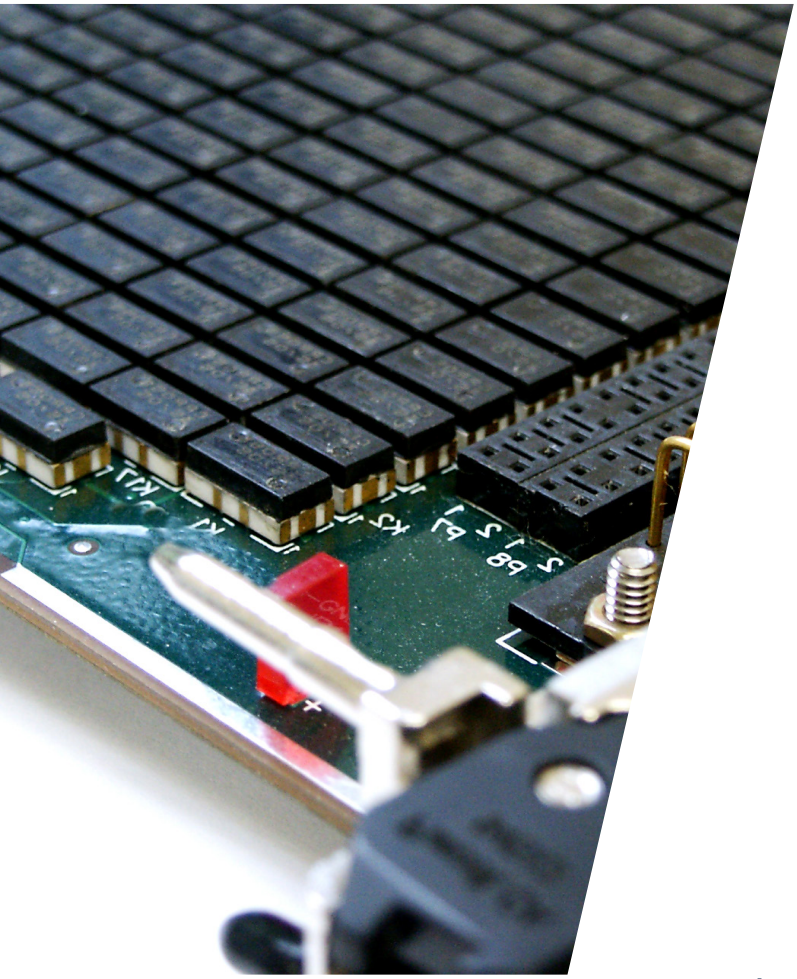
Reed Switch & Sensor Technology for Test & Measurement Applications

With the ever-increasing requirements for Detect and electronic systems, the need exists to be able to make voltage and current measurements covering several orders of magnitude from nano-volts to kilovolts and from femtoamps to amps.

Our specialized Reed Relays have helped designers meet this challenge and are ideal for testing power discrete semiconductors like power fets, mosfets, power transistors, etc.

Test and Measurement

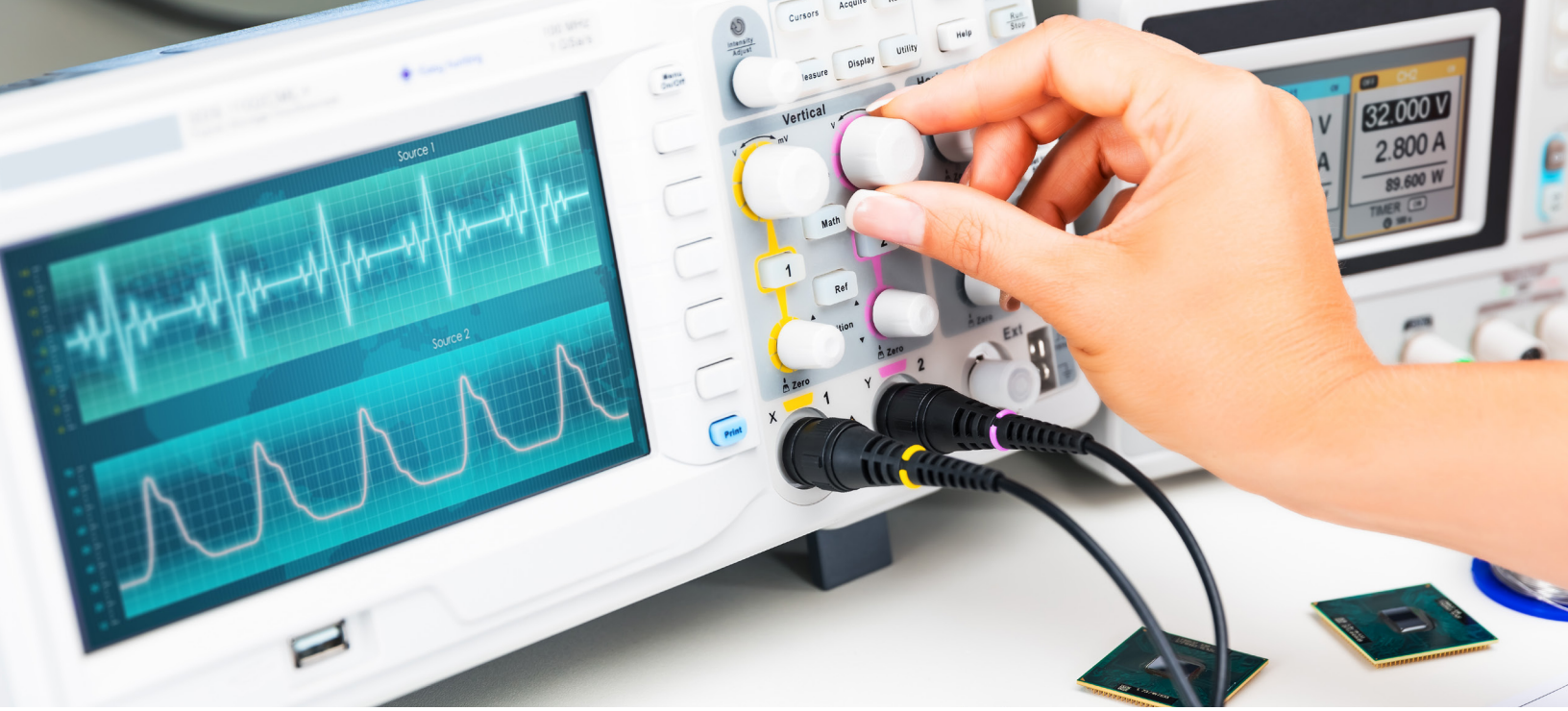
- Automatic Test Equipment (ATE) Systems
- PCB Testing
- IC Testing
- Aero Testing for Transient Voltage Suppressors (TVS) That Prevent ESD and Lightning Damage to Sensitive Electronic Equipment
- Testing Integrated Circuits Such As:
  - Digital Memory Chips
  - VLSI
  - ASICS
  - Microprocessors
  - Analog Chips
  - Mixed Signal (Analog and Digital)
  - Discrete ICs



PCB Testing - Reed Relays Are a Key Component in Testing Functional PCBs

Almost every piece of electronic equipment today uses printed circuit boards (PCBs). These PCBs range from a few square mm (0.08 square inches) to as large as 600 mm by 600 mm (2 ft by 2 ft). On the larger PCBs there may be 1000s of test points that need their functionality determined.

Because of size restrictions, isolation, relatively fast acting and good RF characteristics, Reed Relays are often chosen as the testing switch. A fully loaded tester can house over 20,000 Reed Relays. If there is one relay failure, this is equivalent to a failure level of 50 part per million (PPM).



IC Testing - Reed Relays in Testing Integrated Circuits

Whether we are checking the time on our wristwatch, making a phone call, watching children play with their electronic toys, or at work/home on our computer, etc – integrated circuits are at work getting the job done. Chip designers continue to develop new integrated circuits that are smaller, faster acting and have more switching gates.

Standex's line of RF relays are specially designed to switch and pass fast digital pulses in a 50 ohm impedance environment while offering excellent isolation.

Switches used in testing have to be carefully selected making sure they can switch and carry these fast pulses without distortion and operate in a reliable manner for billions of operations. Test equipment designers have found that Standex Detect' specially designed ultra-small relay series capably accomplishes the task for billions of operations.

Oscilloscopes - Reed Relays

Standex Reed Relays play a key role in the necessary feedback loops for operational amplifiers within oscilloscopes.

The CR series is one of our smallest and most versatile RF frequency Reed Relays. Not only is it excellent with RF signals, but it is also great for digital signals where the skew rates or effects on the rise time of fast digital pulses is less than 40 picoseconds (ps) through the relay.

This makes it ideal for use in digital oscilloscopes.









Reed Switch & Sensor Technology for HVAC Applications

Sensors in HVAC devices play a very important role. A typical unit can accumulate up to 15 gallons (60 liters) of water in a single day. With this much water being produced, care must be taken with the reservoirs to prevent water overflow.

Reed sensors provide a reliable way to detect maximum levels to either alert the user or turn on a water pump.

Air Conditioners and Dehumidifiers

Air conditioners and dehumidifiers often work together in unison. Both systems condense a serious amount of water vapor from the air creating large volumes of water. Storage containers or reservoirs must be monitored in some fashion for potential water overflow.

Flood Sensors

Our flood sensors come in three different mounting options with customizable variations on the PVC fittings. The package does not require the adjustment needs of a threaded sensor, allowing for easy-to-use/ install, service, and options for a reliable “plug-and-go” product.

HVAC & Plumbing

- Furnaces Air Conditioning Compressors, Air Conditioning Condensers, Dehumidifiers
- Humidifiers
- Fluid level sensors
- Gas Smart Meters
- Electric Smart Meters, Instant Water Heaters, Standard Water Heaters, Water Meters
- Shower Pumps
- Pool and Spa Pumps Sprinkler System Controllers
- Level Detection
- Temperature Detection
- Flood Prevention
- Water Flow Measuring
- On/Off Switch
- Sump Pump Levels Monitoring
- Primary Power Usage
- HVAC Overflow
- Primary Water Flow



Reed Switch & Sensor Technology for Telecom Applications

Telecommunications applications such as RF receivers (electronic listening devices) are ideally suited for using RF reed relays, while sensors are used in animal, fish, and human tracking devices.

Portable Radios

When switching between transmit and receive on portable radios, reed relays have become the design-in choice, because they are hermetically sealed and packaged in a rugged epoxy. This makes them an ideal choice for the outdoor environment.

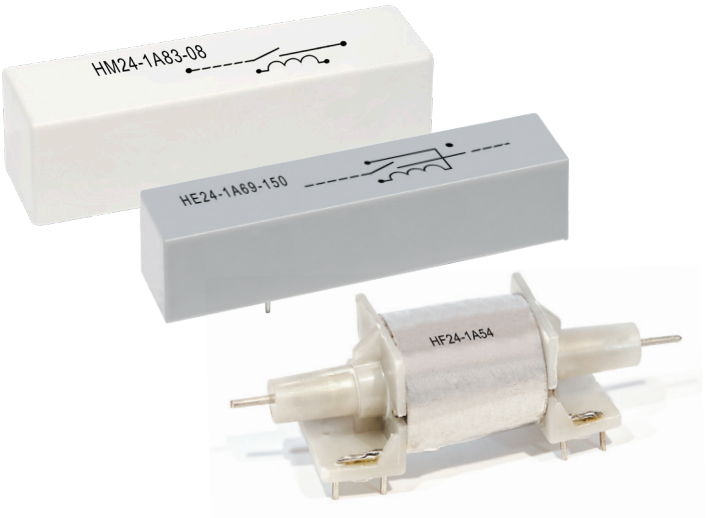
RF Receivers

Sophisticated electronic scanning receivers require the ability to scan large frequency bands in an eficient manner. To cover these wide frequency ranges RF switches must be employed.

Having the ability to carry the wide range of frequencies without adding any distortion. Reed technology is an ideal choice to ensure reliable functionality even under the most stringent environmental and switching requires.

Telecom

- RF Receivers
- Portable Radios
- Off-hook Switching



Reed Switch & Sensor Technology for HVAC Applications

Consumer Detect are one of the fastest moving markets covering a broad spectrum of products each with unique switching requirements in a variety of sizes. Standex Detect has the broadest selection of magnetic sensing solutions in the marketplace.

Barcode Scanner

Most 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–allow for hands-free scanning use while providing the most reliable results.

Consumer Electronics

- Air Conditioner
- Appliance Door
- Barcode Scanner
- Carpet Cleaners
- Cell Phone
- Electric Toothbrush
- Hot Tubs & Spas
- Hotel Card Reader
- Laundry Dryers
- Stove Control
- Utility Meter
- Water Flow
- Window Sun-shades

Hotel Card Reader

Reed sensors, once activated, turn on the Detect which in turn activate the magnetic strip reader. The strip reader then reads the magnetic strip on the card and if it is correctly designated, the door lock will deactivate allowing the door to be opened.

Once this occurs, the Detect with shut down again to conserve battery power. The reed sensor will sit in its inactivated position and will draw zero power.







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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