Standex DETECT Electronics

Advantages of Employing Reed Switches and Sensors in the Renewable Energy Industry



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04 Summary



Over the years, the renewable energy market has grown significantly, and this trend continues with further improvements in adoption. Today, according to the International Energy Agency, renewable energy sources (RES) supply around 28% of the global electricity supply. Concurrently, the race to meet the climate challenge is putting more pressures on governments and corporations worldwide to cut carbon emissions, which translates into reducing fossil fuels and using more renewables like wind power and solar photovoltaics (PVs).

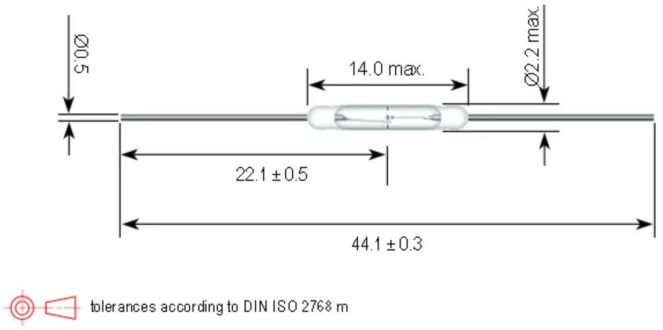
Reed switches and sensors, including relays, play a critical role in enabling reliable, long-lasting renewable energy products across the globe. The primary reason for their popularity in the renewables space is that they consume zero power, last longer, and provide a hermetic seal that enables them to operate in harsh environments over a wide temperature range.

Many more features make reed switches and sensors attractive for a wide range of renewable energy applications, including smart homes and smart grids. They include:

- Extra-long life
- Ability to switch or carry as low as 10 nV and 1 fA without signal loss
- Ability to switch up to 10,000 volts
- Capable of carrying high currents
- Dynamically tested contacts
- High insulation resistance across the contacts – > 1015 ohms
- Low contact resistance – less than 50 milliohms
- Requires no power or circuitry in off state
- Offers a latching feature
- Low operation time – in the 100 ms to 300 ms range
- Capable of operating 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 of up to 200 Gs and vibration of 50 Hz to 2000 Hz at up to 30 g• Offers billions of operations
- Low switching noise
- Large assortment of package styles

Additional Reed Switch Facts and Attributes

Additionally, with shrinking spaces in systems, the reed switch has also shrunk in size from approximately 50 mm (2 inches) in length to 3.9 mm (0.15 inch) with time. In fact, the 3.9 mm long reed switch is the smallest in the world, designed to fit in very tight spaces, while maintaining a very narrow sensitivity range and fast operating time. In addition, the switch is carefully packaged so that no stress is induced on the elements, which is critical for proper operation and long life of the product, especially in renewable energy applications where the outdoor environment is harsh with wide variations in temperature.



Furthermore, because it can be easily enclosed in a simple pack age with a sensing element, it can also be utilized as a low cost sensor using a permanent magnet for actuation. In this sensor form, a permanent magnet plays an important role in opening and closing the switch contacts. Also, the methods used for actuation can vary, depending on the end product. As a result, the reed switch can operate in multiple modes, going from normally open to normally closed or a latching mode. Simply bringing the magnet close to the reed blades or moving it away changes the state of the reed blades (Figure 1).

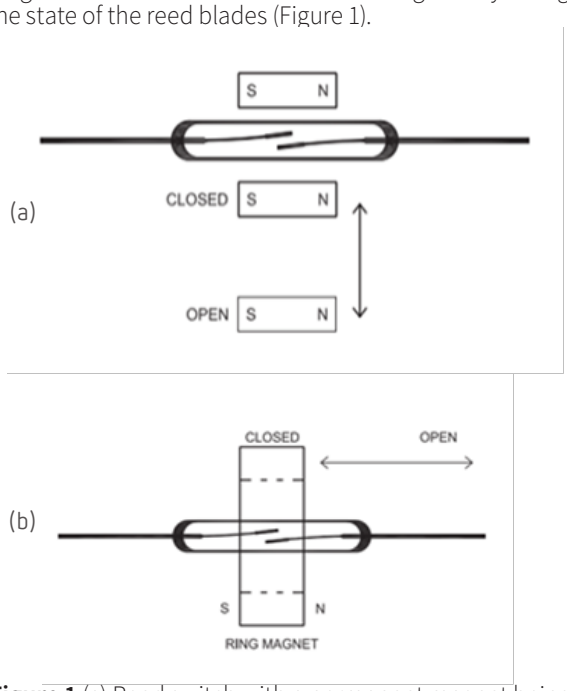


Figure 1 (a) Reed switch with a permanent magnet being moved in front-to-back motion. (b) A reed switch effectively passing through the center of a circular magnet for opening and closing contact points.

Unlike the reed switch, which uses a bar magnet to open or close blades, a reed relay uses a coil for operation (Figure 2). As current passes through the coil, it creates a magnetic field, and the contacts become magnetized and are attracted to each other. As the field is increased, a point is reached where the contacts close. Removing the current removes the field, and the contacts then spring apart. Some of the advantages of reed relays include small size, faster switching speeds, and complete isolation between the switching current and the circuit.

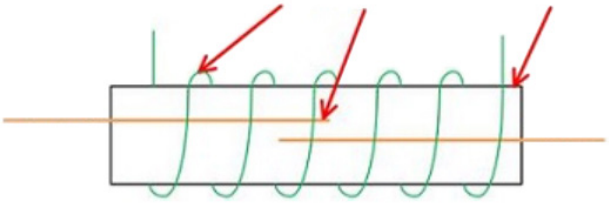


Figure 2 Reed relay uses electromagnetic coil for operati**on**

Efficient, Sustainable, and Safe

Some of the applications in the renewable sector deploying reed switches and sensors include wind turbines, solar panels, e-bikes, and EV charging to name a few. When it comes to sensing wind turbines, surface mount reed sensors (Figure 3) are used for precisely detecting motion in a wind turbine's rotor. However, when the wind is excessive, the reed sensor signals the turbine rotor to disengage from the power generation mechanism to prevent gear train damage. Also, the reed sensors are designed in a robust thermoset over-molded package, which is impervious to extreme temperatures and harsh conditions. By using a simple magnetic field detection, the reed sensor senses the rotor speed without any contact.



Figure 3 Standex offers surface mount reed switches and sensors in a wide range of connection options

Another use of reed switches in renewable energy products is in developing simple and cheap RPM meters – devices which detect and count each rotation of a wind turbine. The speed of rotation (measured in revolutions per minute or RPM) can therefore be calculated. A small magnet is fitted to a rotating part of the wind turbine in such a way that it passes close enough to the reed switch, which is in a fixed position, so that the reed switch is triggered each time the turbine completes one revolution. By calculating the number of times the reed switch was triggered per minute, wind turbine RPM can be calculated.

Likewise, reed relays and switches are also used for high voltage and isolation applications in photovoltaics and solar power. Solar inverters generate AC power like the utility grid. The two grids are connected while being in a safe operating environment in which the high isolation needs to be measured and checked on a regular basis to meet safety standards. Reed relays provide the necessary high isolation while in the open state, and a low contact resistance when closed. The contacts are hermetically sealed, allowing it to operate in the most stringent of environments that may be perceptible to dust, shock, corrosion, and humidity making it more than suitable for solar inverter and photovoltaic applications.

A Dependable Solutions Supplier

Because of its vast portfolio of high quality and reliable reed switches, relays, and sensors tailored for a wide variety of applications, including renewable energy, Standex Detect can play a vital role in selecting the best product for any wind power and solar energy application, including any custom designs. From detecting motion in wind turbines to isolating inverters in solar application or interfacing renewable power sources with the utility grid, Standex Detect components can perform with the required safety and reliability — while consuming very little to no power. They are available in a wide range of connection options, housing forms, and mounting choices, and all its products meet international safety standards, as the company is certified to the automotive quality standards ISO/TS 16949:2009 and ISO 9001:2008.

In short, selecting the right reed switch, relay or sensor for any renewable energy application is not a trivial task. Only an experienced engineer with knowledge of the available solutions can select and guide you through this maze of 1000+ products.

While several suppliers serve this market, only one stands out as a leader. With over 50 years of experience, Standex Detect is the world's largest manufacturer of reed switches (>700M/year) with >50% market share, and offers the most comprehensive listing of reed switches, relays and sensors that covers all sensing and switching requirements in the renewable energy world. For applications that need a custom solution, Standex Detect has the capability and experience to deliver a custom solution that is optimized for a customer's specific and unique task.

Summary

With a broad portfolio of reed switches, relays, and sensors, combined with over 65 years of experience and knowledge in designing and producing these products for multiple industries, which includes renewable energy sources, Standex Detect is a one-stop shop for any company, small or large, that is looking for the best, most reliable, and cost-effective solution for any specific application in the renewable space. Its manufacturing facilities have AS9100, ISO9001 & IATF16949 certifications and ITAR compliance, while its products are RoHS, REACH, UL, c-UL, ATEX & IECEx, and VDE compliant. Standex Detect is the preferred worldwide source for reed switches, relays, and sensor products. Think of Standex Detect as your partner in solving your renewablenergy challenges.



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