Reed Switch Technology

Product Training
Introduction

Purpose

- Discover Standex-Meder Electronics’ Reed Switch Technology

Objectives

- Explain reed switch function and unique features
- Explain the structure and manufacture of a reed switch
- Explain some basic switch parameters
- Describe reed switch applications and basic operation
What is a Reed Switch?

Electromechanical switching device

- Consists of two ferromagnetic reeds
- Hermetically sealed glass envelope
- Switching occurs when brought into a magnetic field generated by a permanent magnet or electromagnetic coil
- Range in size from 0.025” to 2” long
Why is the Reed Switch Unique?

- Unique Characteristics
- Very simple in its structure
- Hermetic seal allows them to exist or operate in almost any environment
- No wearing parts
- Reliable switching for billions of operations
- Draws no power in the normally open state
Reed Switch Structure

**Glass Tube**
- Temperature Coefficient of Expansion (TCE) of glass exactly matches NiFe reeds
- Hermetically sealed
- Both ends of the glass tube are heated and the glass melts and forms the hermetic seal encompassing both ends.
- During the glass sealing process the glass cavity is usually filled with an inert gas (typically nitrogen) or the cavity may be evacuated creating a vacuum. This vacuum usually supports high voltage switching (in excess of 1000 Volts).
- Nitrogen filled
Reed Switch Structure

**Reed contacts**
- Nickel/Iron (NiFe) alloy
- Under layer of gold, copper or Tungsten 0.25µm to 0.5µm
- Outer layer rhodium, ruthenium or iridium 1.0µm to 2.0 µm
Basic Switch Parameters

- Pull-In (PI) refers to the point where the reed switch contacts close
- Drop-out (DO) refers to the point where the reed switch contacts open
- Ampere Turns (AT) or milliTesla (mT) define the relative magnetic strength or sensitivity of the opening and closing points
Basic Switch Parameters

- Hysteresis is the ratio of the drop out and the pull in, and is measured as a percent (%) or decimal.

Example: $12 \text{ mm} / 20 \text{ mm} = 0.6 \times 100\% = 60\%$ Hysteresis meaning the switch will activate at 60% of its release point.
Standex-Meder To OKI AT Conversion

OKI #3  ORD2210V, ORD229
OKI #6  ORD219, ORD228VL, ORD9215, ORD9216
OKI #8  ORD213, ORD211
OKI #10 ORT551
Reed Switch Applications

Applications

- Switching, non contact sensing, liquid level monitoring and counting
- As a Reed Sensor or Level Sensor using the externally applied magnetic field produced by a permanent magnet when brought into proximity to the reed switch
- As a Metal Detection Sensor by detecting a ferromagnetic sheet or plate
- As a Reed Relay, the reed switch is activated when the electromagnet coil is energized producing a magnetic field around the switch
- Vehicles, safety engineering, household appliances, medical devices, telecommunications and industrial systems
Reed Switch Operation

As a Reed Sensor

- Switch contacts will close and remain closed when a magnet is brought into proximity with a reed switch.
- Contacts will reopen and remain open once a magnet is distanced from the switch.
Reed Switch Operation

As a Metal Detection Reed Sensor

- Switch contacts will close and remain closed when a ferromagnetic object is moved into proximity with metal detection sensor (MK02 Series panel or PCB mount).
- Contacts will reopen and remain open once ferromagnetic material is distanced from the MK02 sensor.
Reed Switch Operation

As a Reed Relay

- Relay power OFF – Switch contacts remain in normally open state and draw no power
- Relay power ON – Coil is energized and switch contacts close and remain so until coil is turned off
Reed Switch Operation

Water Flow Sensor

- Reed Switch is secured to stationary object
- Permanent magnet rotates on moving paddle
- Rotation speed varies with filter debris volume
- Water flow is detected by paddle speed signaling filter status indicator lights
Reed Switch Operation

Liquid Level Sensor
- Floats have built-in ring magnet
- Float magnet slides over switch with change in fluid level causing reed switch to activate
- Reed switch activates LED indicator
A Reed Switch is a small electromechanical device having two ferromagnetic reeds hermetically sealed in a glass envelope. When brought into a magnetic field, the reeds will close, creating a switching function.

They are very simple in structure and are hermetically sealed so that they can be used in almost any environment. Protect from the outside environment, the contacts are not susceptible to wear and will typically perform billions of reliable operations.
Typical applications include but are not limited to:

- Test and measurement
- Security and alarm
- Household appliances
- Automotive
- Medical devices
- Telecommunication
- Industrial applications
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