Standex-Meder Electronics

Custom Engineered Solutions for Tomorrow
Latch & Form B Reed Relays & Sensors

Product Training
Introduction

Purpose

- Explore the technology involved in the use and operation of Form B and Latching Reed Sensors & Relays

Objectives

- Define key terms of Form B and Latching sensors and relays
- Describe the structure and function of a Form B and Latching Reed Relay
- Describe the structure and function of a Form B and Latching Reed Sensor
Key Terms

**Contact** - Contact blades making up a Reed Switch or Electromechanical Relay

**Contact, Form A** - A single pole single throw (SPST) normally open (N.O.) switch

**Contact, Form B** - A single pole single throw (SPST) normally closed (N.C.) switch

**Contact, Form E** - A latching contact that can exist in either the N.O. or N.C. state controlled by reversing the magnetic field
Key Terms

Bias or Permanent Magnet
- Steady magnetic field
- Applied to the magnetic circuit of a relay or sensor
- Aids or impedes operation of the switch contacts

Coil
- Electromagnetic assembly made of copper insulated wire
- When current is applied to the coil, a magnetic field is generated
- When energized, its magnetic field operates the contacts

De-energize
- The act of removing power from a relay coil

Energization
- The application of power to a coil winding of a relay
**Key Terms**

**Reed Switch or Reed Sensor**
- A bare or encased switch containing glass sealed magnetic reeds as the contact members including mercury-wetted and dry contact types

**Reed Relay**
- A relay containing one or more internal reed switches

**Latching Relay**
- A relay that maintains its contacts in the last assumed position without needing to maintain coil energization. To change the state of the contacts, the magnetic field must be reversed.

**Normally Open (N.O.) Contacts (Form A)**
- The contact state before any magnetic field is applied to them in which they exist in the open state

**Normally Closed (N.C.) Contacts (Form B)**
- The contact state before any magnetic field is applied to them in which they exist in the closed state.
FORM B NORMALLY CLOSED
REED RELAYS
Overview of Form B Normally Closed Reed Relays

- The normally open Form A reed relay’s internal reed switches exist in the normally open state.
- Applying coil power closes the contacts.
- The relay contacts may remain closed for long periods of time supplying continuous power such as in safety circuits.
- The Form B reed relay allows contact closure for extended periods without continuous power draw.
Form B Normally Closed Reed Relays

- Normally Closed (Form B) Reed Relays require the use of a permanent magnet.
- This magnet is adjusted such that the reed switch changes from its normally open state to a normally closed contact state.
- In this case, no current or external energy is expended maintaining the reed switch in the closed position.
Form B Normally Closed Reed Relays

- A relay coil of equal strength and opposite polarity is needed to open the Reed Switch in the reed relay.
- To open the contacts, the relay coil is energized with the relay’s nominal voltage.
Form B Normally Closed Reed Relays

**Permanent Magnet**
- A permanent magnet keeps the contacts closed
- No power is required
Form B Normally Closed Reed Relays

Applying power to the Coil
- Apply the relay’s nominal coil power to open the contacts
- The correct coil voltage polarity is important
Form B Normally Closed Reed Relays

- De-energizing the coil returns the contacts to their normally closed contact state provided by the permanent magnet.
LATCHING REED RELAYS
Overview of Latching Reed Relays

- A latching reed relay has two bi-stable states
  1. Open contact state
  2. Closed contact state
- In either state it draws no coil power
- Generally the latching relay will have two coils
  1. A latching coil that closes the contacts
  2. An unlatching coil which will open the contacts
Overview of Latching Reed Relays

- The latching relay also requires an internal magnet for proper operation.
- The latching relay magnet is partially magnetized such that the reed switch contacts do not fully close.
Latching Reed Relays

1.5ms pulse

RELAY COIL “LATCHING COIL”

PERMANENT MAGNET

UNLATCHING COIL

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Latching Reed Relays

Diagram showing the components of a latching reed relay:
- RELAY COIL "LATCHING COIL"
- PERMANENT MAGNET
- UNLATCHING COIL
- Magnetic field denoted by N and S poles
Latch Relays

RELAY COIL “LATCHING COIL”

PERMANENT MAGNET

UNLATCHING COIL

1.5ms pulse
Latchng Reed Relays
FORM B NORMALLY CLOSED REED SENSOR
Form B Normally Closed Reed Sensor

- Reed sensors also have a reed switch as their main switching element
- These reed switches exist in their normally open state
- Reed sensors generally exist in the normally open state
- The reed sensor can consist of simply a bare reed switch or a packaged device having one or more reed switches and/or magnets
Form B Normally Closed Reed Sensor

- Form B reed sensors follow the same rules as with the Form B reed relays.
- A magnet that has been magnetized to a suitable level closes the contacts.
Form B Normally Closed Reed Sensor

- A magnet of opposite polarity cancels out the magnetic field thereby opening the contacts
- Too strong a magnet may reclose the contacts
- Proper operation requires the correct use of magnetic lobe
Form B Normally Closed Reed Sensor

- Once the magnet is removed the contacts will reclose and stay in that state until a magnet is brought into its influence
LATCHING REED SENSOR
Latching Reed Sensor

- A partially magnetized permanent magnet keeps the reed switch open
- A second magnet with an aiding field will close the contacts
- Removing the second magnet, the contacts remain in the closed state
- Applying the second magnet again with its field reversed opens the contacts
Summary

- The reed relay can be configured as a normally closed reed relay to conserve power when the requirement calls for extended use in the normally closed state.
- The reed sensor can be configured in the normally closed state as well for requirements calling for extended use in the normally closed state.
- For applications calling for extremely small power requirements, a latching reed relay can be the best selection, particularly in battery powered devices.
- Reed sensors can be used in a latching manner for specific design requirements.
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