



REED SWITCH TECHNOLOGY



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Introduction

Purpose

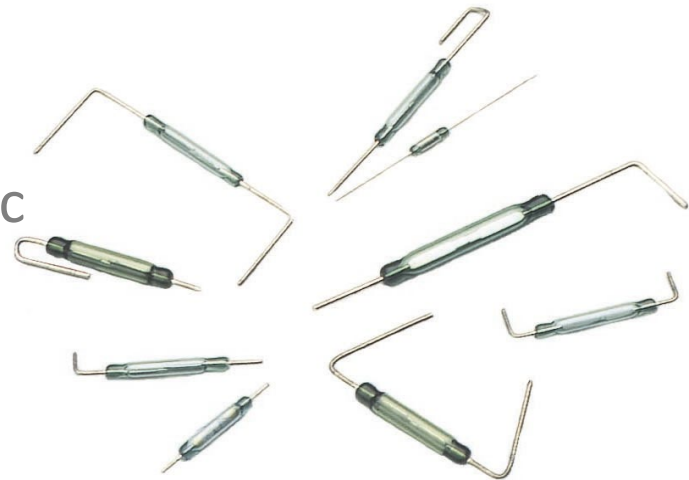
- › Discover Standex Electronics' Reed Switch Technology

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

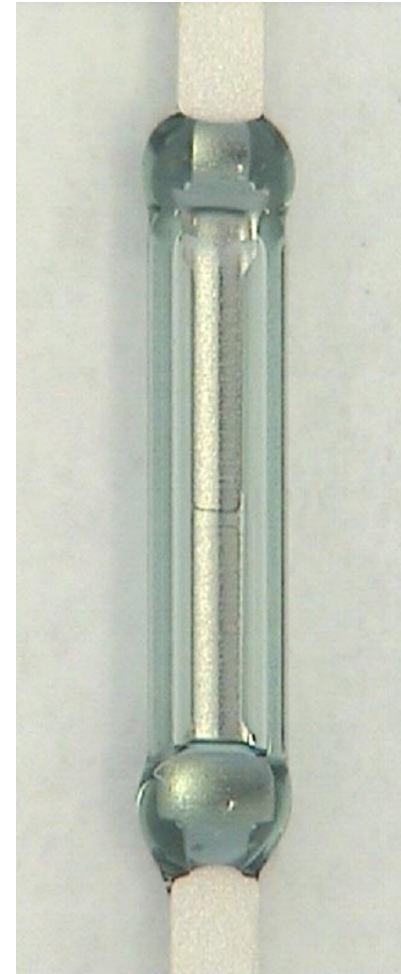
Reliable switching
for billions of
operations

Draws no power in
the normally open
state

Reed Switch Structure

Glass Tube

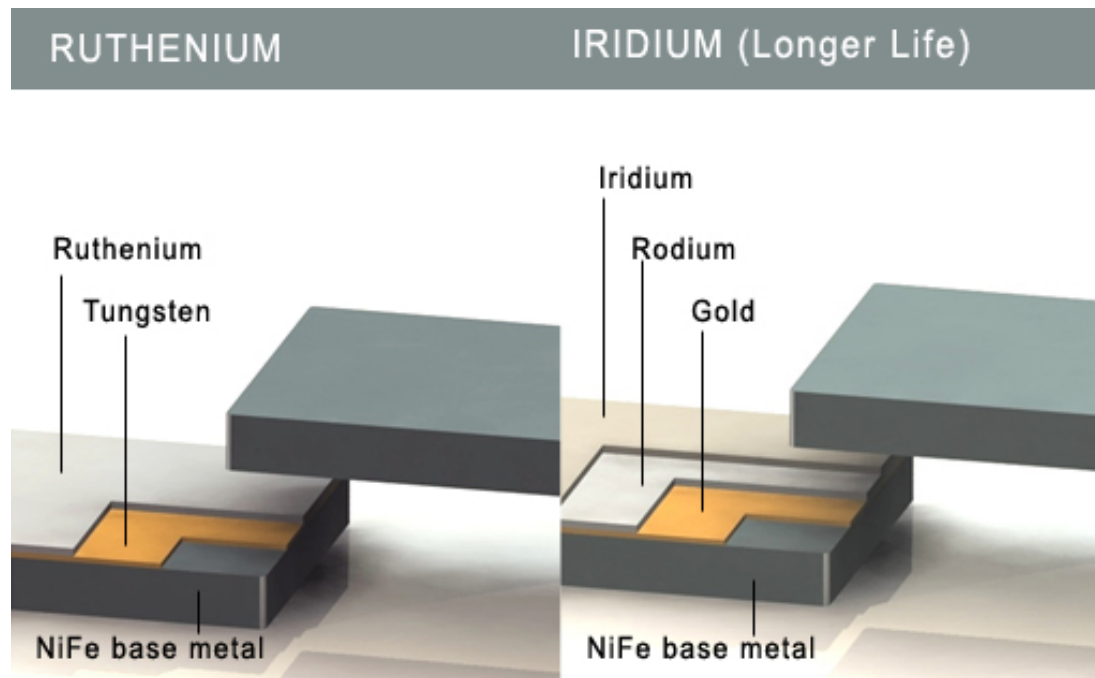
- › Temperature Coefficient of Expansion (TCE) of glass exactly matches NiFe reeds
- › Hermetically sealed
- › Both ends of the glass tube are heated and the glass melts and forms the hermetic seal encompassing both ends.
- › During the glass sealing process the glass cavity is usually filled with an 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 $0.25\mu\text{m}$ to $0.5\mu\text{m}$
- › Outer layer rhodium, ruthenium or iridium $1.0\mu\text{m}$ to $2.0\mu\text{m}$

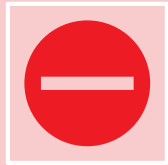




Basic Switch Parameters



Pull-In (PI) refers to the point where the reed switch contacts close



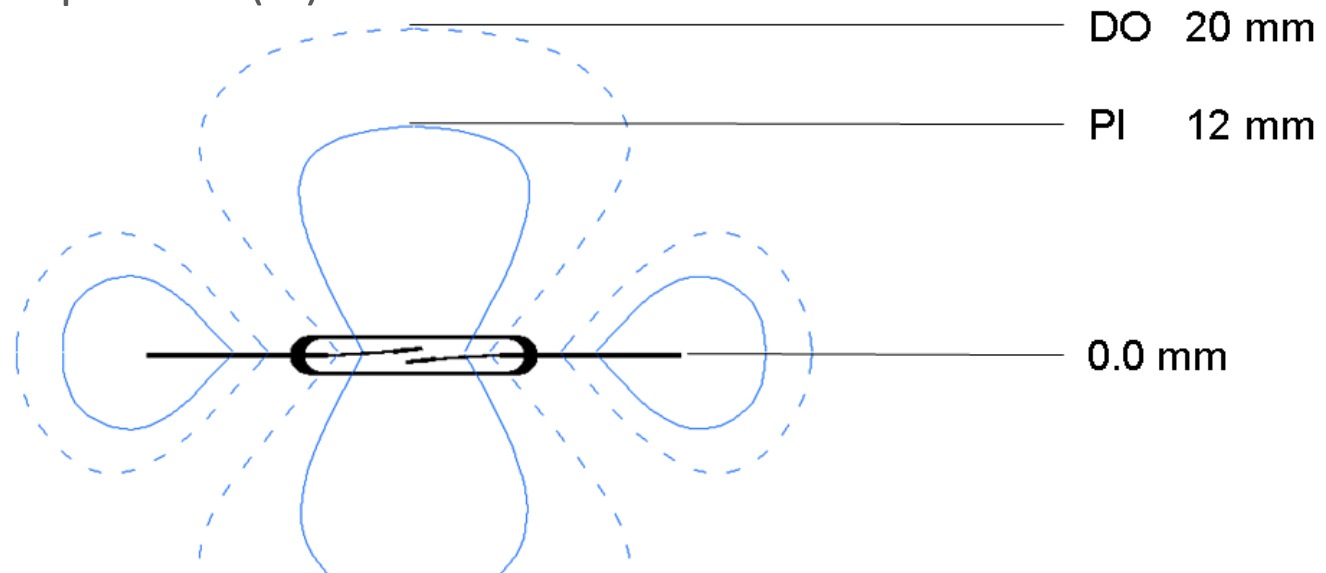
Drop-out (DO) refers to the point where the reed switch contacts open



Ampere Turns (AT) or milliTesla (mT) define the relative magnetic strength or sensitivity of the opening and closing points

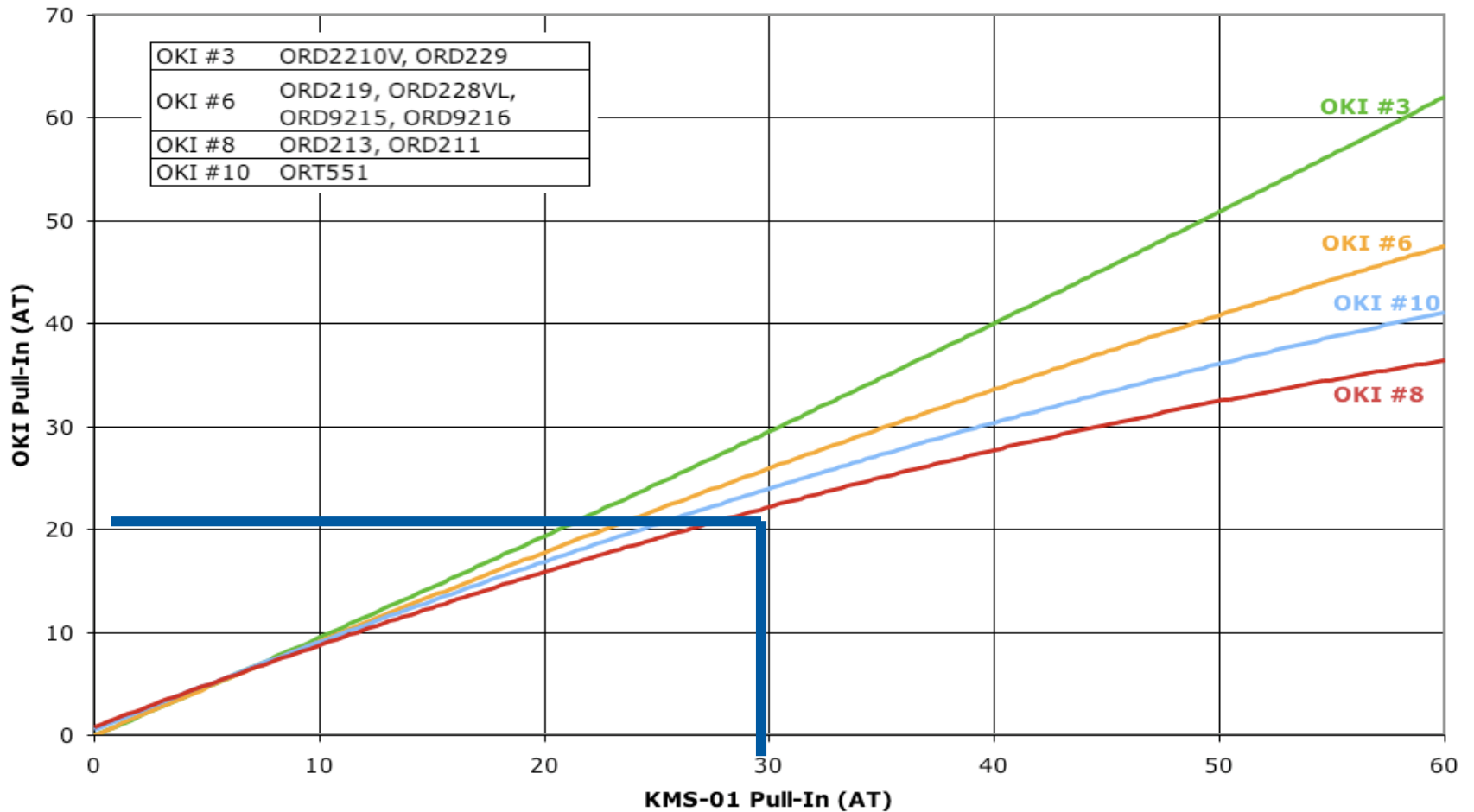
Basic Switch Parameters

- 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 it's release point

Standex to OKI AT Conversion





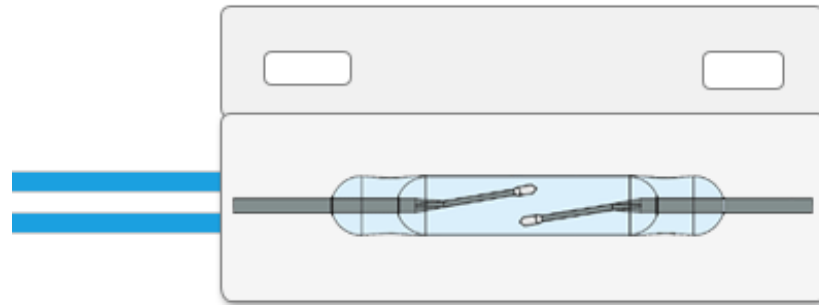
Reed Switch Applications

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



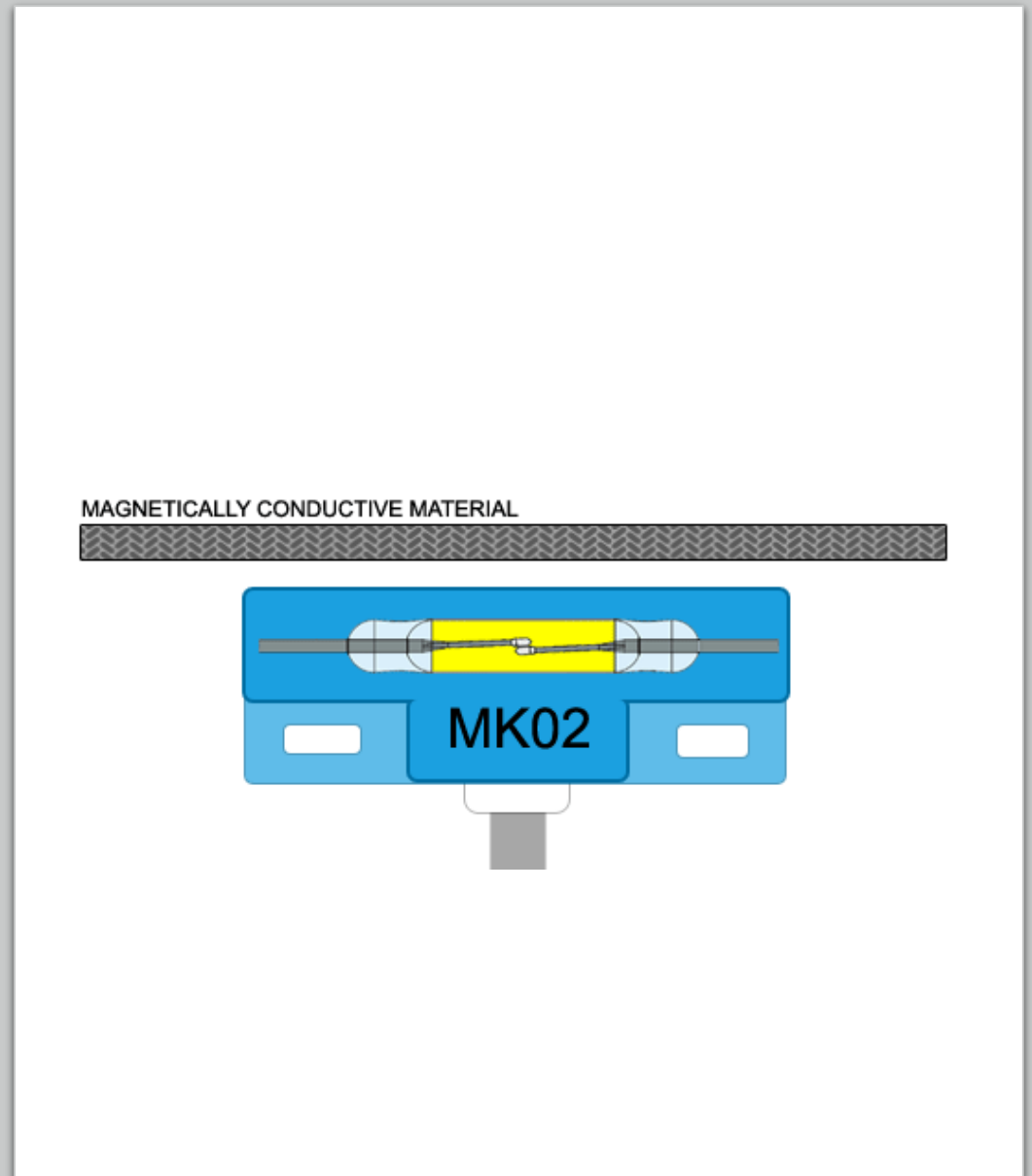
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Reed Switch Operation

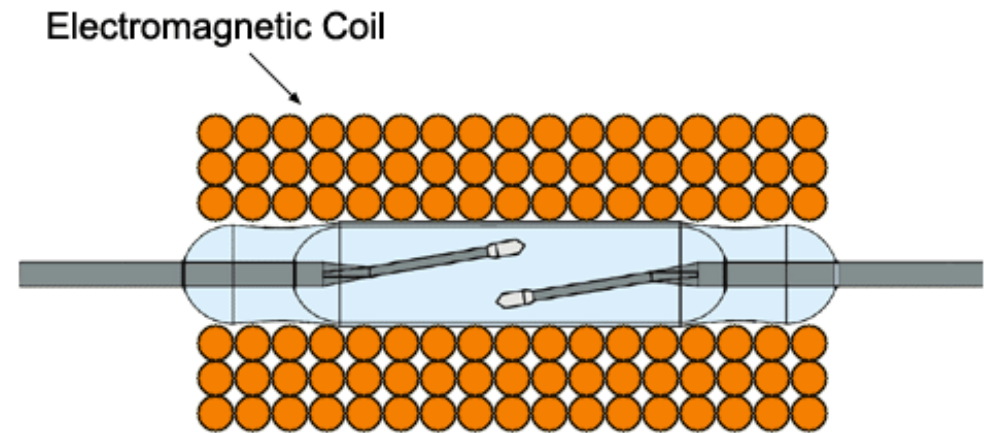
As a Metal Detection Reed Sensor

- 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

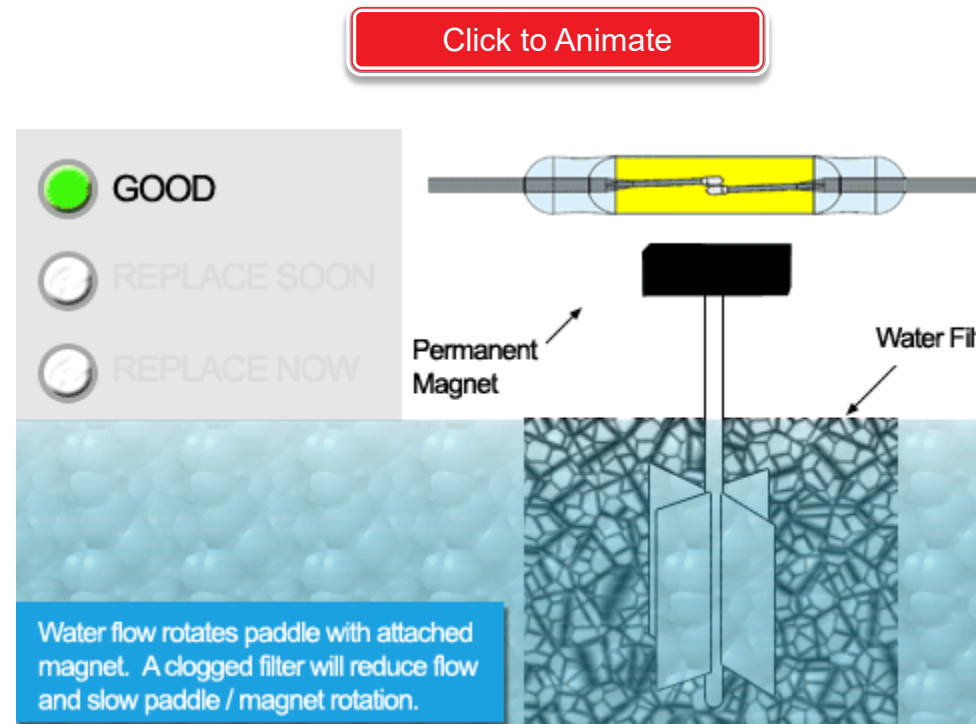
- **As a Reed Relay**
 - Relay power OFF – Switch contacts remain in normally open state and draw no power
 - Relay power ON – Coil is energized and switch contacts close and remain so until coil is turned off



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

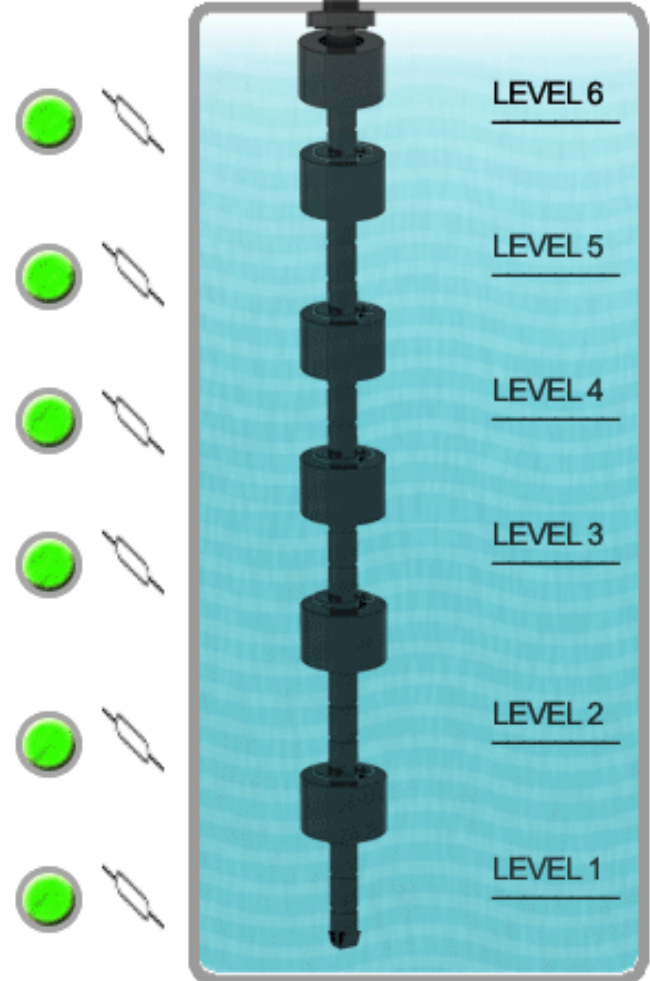


Reed Switch Operation

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

Magnets built into the floats move over the switch activating the LED level indicator



Click to Animate



Applications

Test and measurement

Security and alarm

Household appliances

Automotive

Medical devices

Telecommunication

Industrial applications



Summary

A Reed Switch is a small electromechanical device having two ferromagnetic reeds hermetically sealed 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.

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