INDUSTRIAL ELECTRONICS
DDPE 3103
TOPIC 1
SWITCHING CIRCUITS

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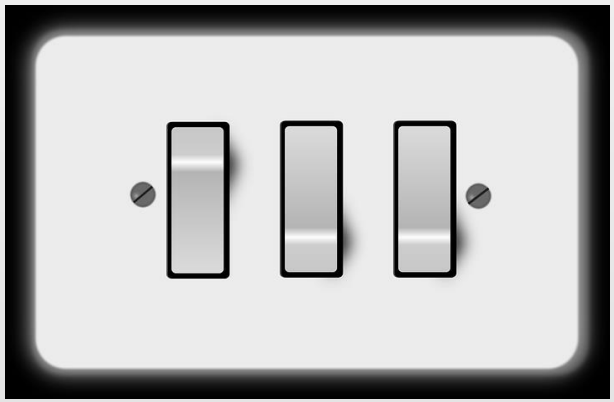
Mechanical Switches

- Mechanical Switches are devices that turn ON and OFF the current flowing along a conductor or a circuit.

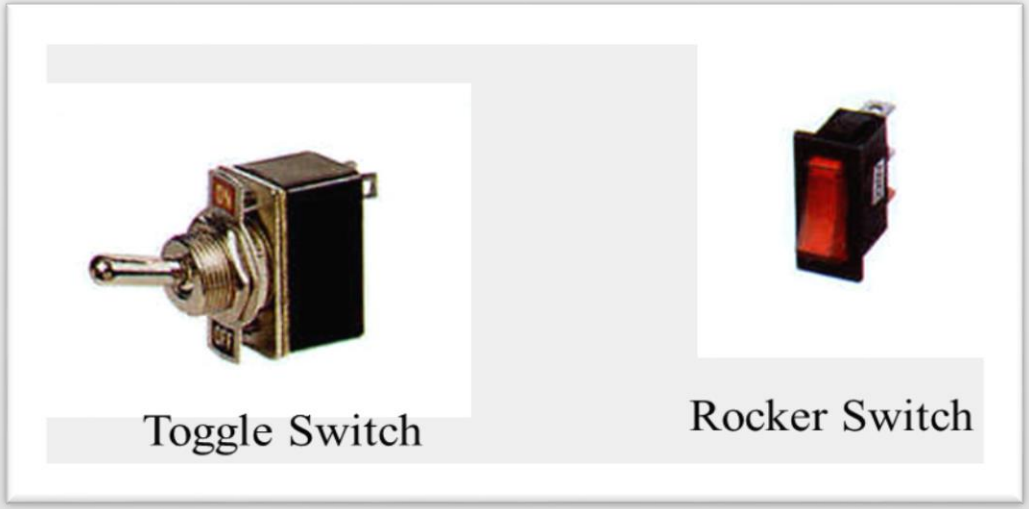


Mechanical switches come in two basic types depending on the switching action.

i. Permanent
ii. Momentary

Permanent Switch

- Permanent type switch changes from 'On' to 'OFF' or 'OFF' to 'ON' and remains at the 'On' or 'OFF' position.
- Example of these switches are Toggle, Rocker, Slide, Rotary and Key switches.



Key switch

Momentary Switch

- The momentary switch need to apply a force to change the switch from 'ON' to 'OFF' or 'OFF' to 'ON'.
- When the force is removed, the switch immediately returns to its original position.
- Example are : Push, Reed and Micro switches

Push Switch

Reed Switch
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Micro Switches
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RELAY

- **Relays** act as remote switches that open and close circuits electromechanically or electronically.
- The relay control one **electrical** circuit by opening and closing contacts in another circuit.
- When a **relay** contact is closed the relay is said to be energized.

Types of Relay

1. Mechanical relay

Mechanical relays operate by applying a current through a coil magnet which then pull a flexible, spring-loaded conductive plate from one switch contact to another.

2. Electronic relay (Solid – State Relay)

A **solid-state relay (SSR)** is an electronic switching device that contains no moving parts and switches on or off when a small external voltage is applied across its control terminals. In an SSR a small control signal controls a larger load current or voltage

Poles and Throws

1. **Poles** are consider as the input terminals of a switch and these define how many separate circuits the switch can control.
   - A ***single-pole*** switch controls just one circuit.
   - A ***double-pole*** switch controls two separate circuits.

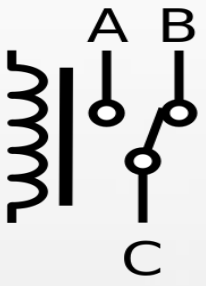
2. **Throws** are consider as the output terminal of a switch and these define how many separate output circuit can each of the switch's poles can be connected to

- A single-throw can connects to one output circuit
- A double-throw can connects to one of the two output circuits.

Arrangement of Relay

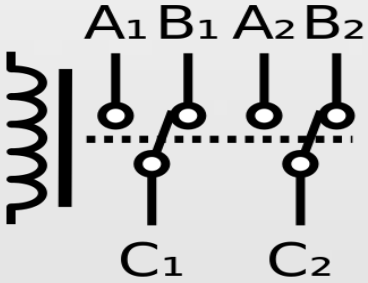
1. Single Pole Single Throw (SPST)
2. Single Pole Double Throw (SPDT)
3. Double Pole Single Throw (DPST)
4. Double Pole Double Throw (DPDT)

SPST



SPDT

DPST



DPDT

References

1. Motor Control Fundamental, by Steve Senty, Cengage Learning, 2012, ISBN 1133709176, 9781133709176, 288 pages
2. National Instruments , *2016*

- Electric Relays: Principles and Applications (Electrical and Computer Engineering) by Vladimir I. Gurevich, 1st Edition , ISBN-13: 978-0849341885 , ISBN-10: 0849341884 , 704 pages

3. This Automotive Series , UNDERSTANDING RELAYS has been developed by Kevin R. Sullivan