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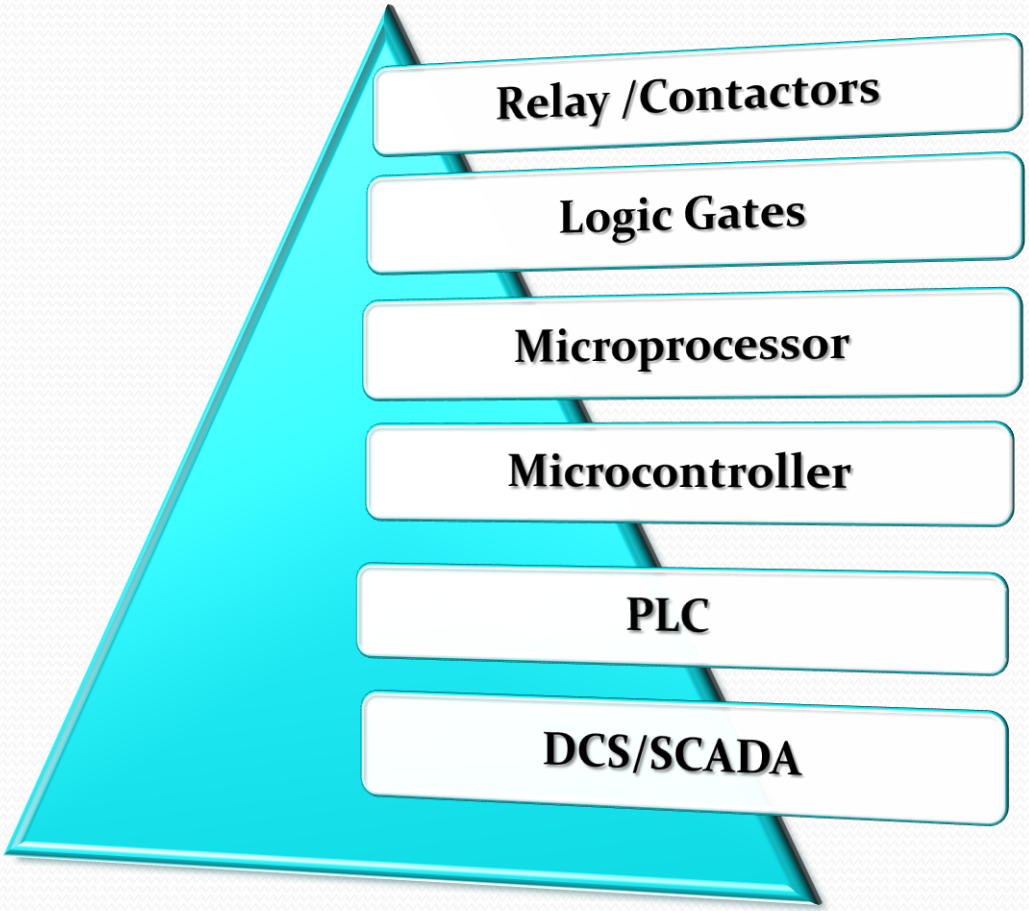
Control History



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Principles of Automatic Control

1- • Relay / Contactor Control

2- • Programmable Logic Controller PLC

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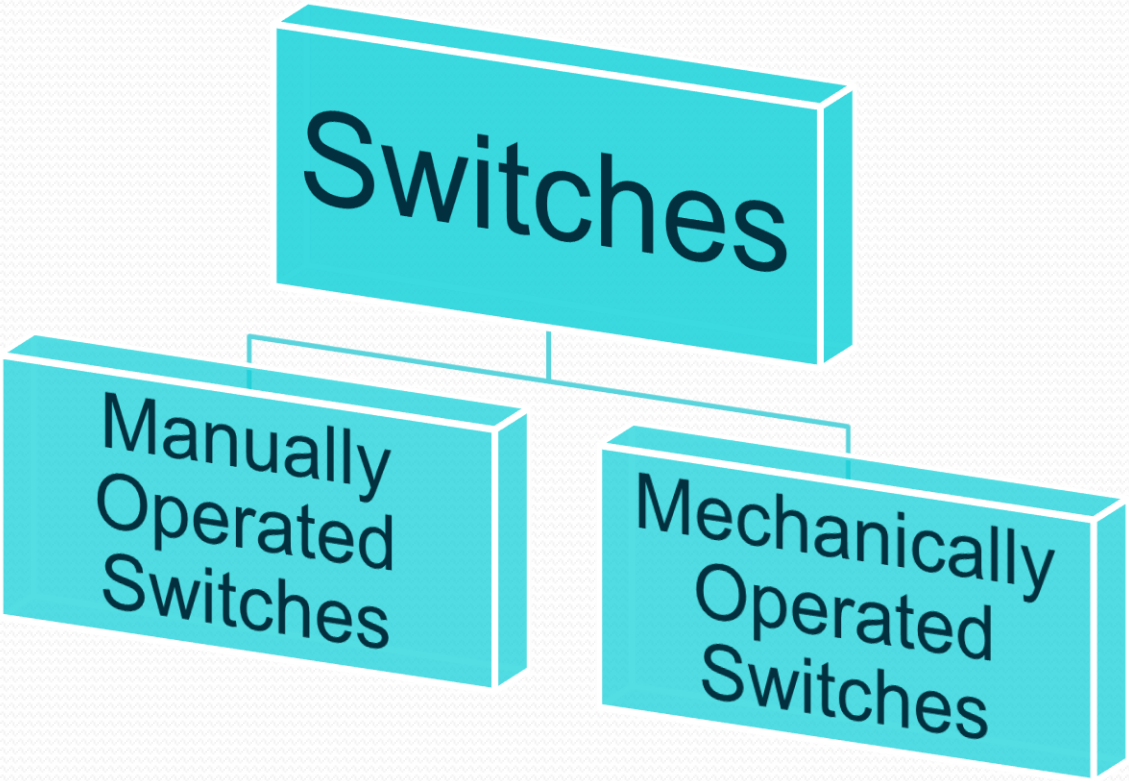
What are the types of switches ??

Switches



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Manually Operated Switches

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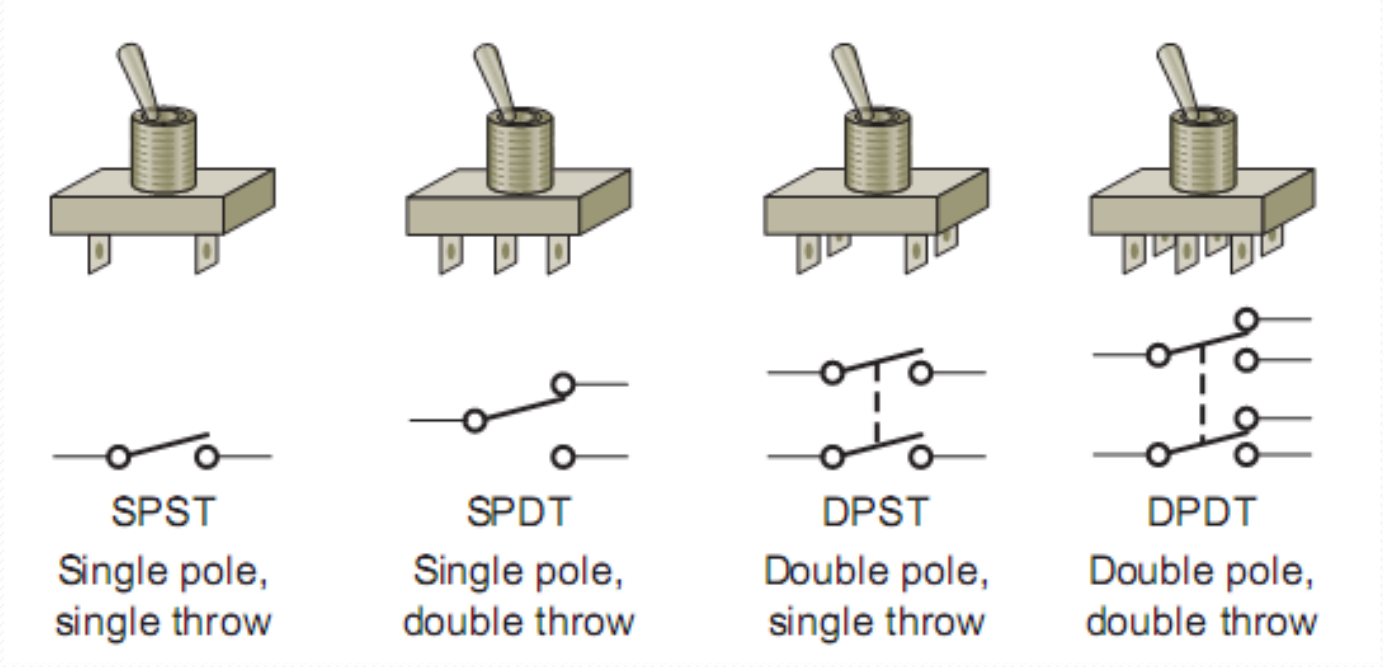
Switches

Toggle Switches

Toggle Switches are manually operated switches .

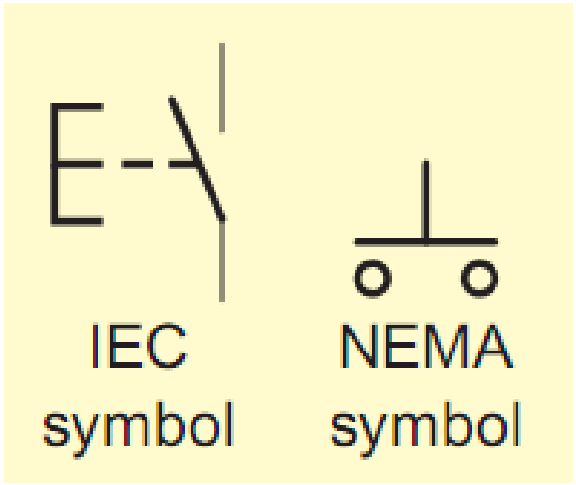


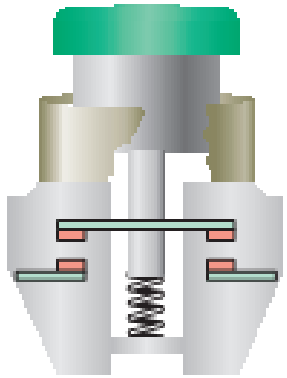
Switches

Pushbutton Switches(PB)

- Pushbuttons are manually operated switches.
- A push button operates by pressing a button that opens or closes contacts.
- Abbreviations N.O. (normally open) and N.C. (normally closed) represent the state of the switch contacts when the switch is not activated.

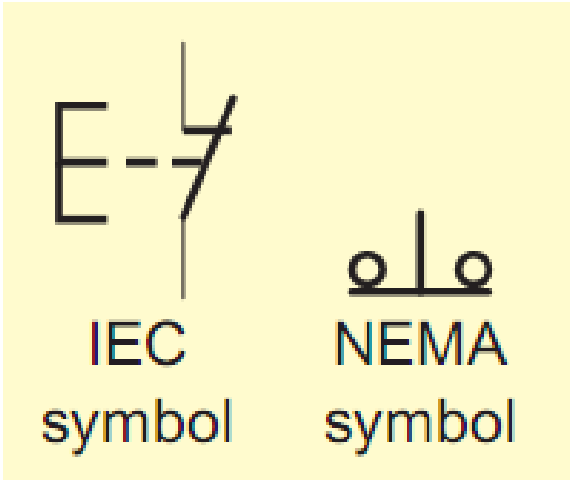
- The NO PB makes a circuit when it is pressed and returns to its open position when the button is released.

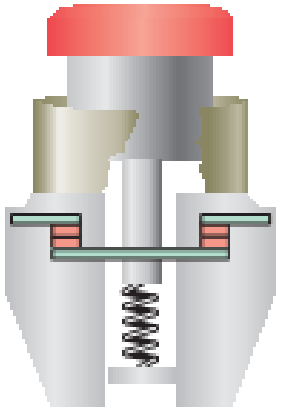




N.O. (normally open) pushbutton

- The N.C. PB opens the circuit when it is pressed and returns to the closed position when the button is released.





N.C. (normally closed) pushbutton

Pushbutton station—NEMA Type1.

NEMA: National Electrical Manufacturers Association

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Switches

Selector Switches

- Selector Switches are manually operated switches .
- These switches may have two or more selector positions.
- Switch positions are established by turning the operator knob right or left.

Selector switch

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Mechanically Operated Switches

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Switches

Limit Switches

- ✓ Limit switches are mechanically operated switches
- ✓ Limit switch is controlled automatically by factors such as pressure, position, and temperature.

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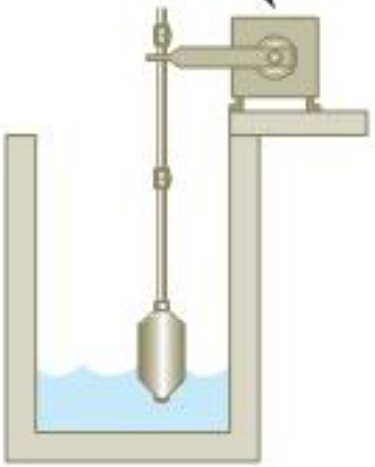
Switches

Pressure Switches

- ✓ Pressure Switches are mechanically operated switches
- ✓ Pressure Switches are used to monitor and control the pressure of liquids and gases.

Float switch



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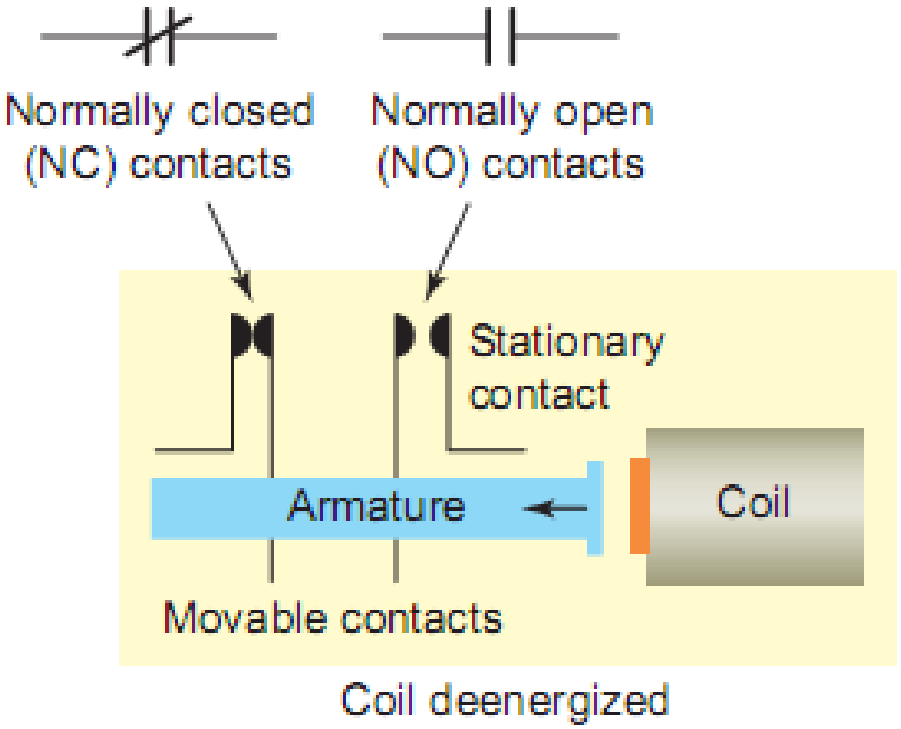
Electromechanical Control Relays

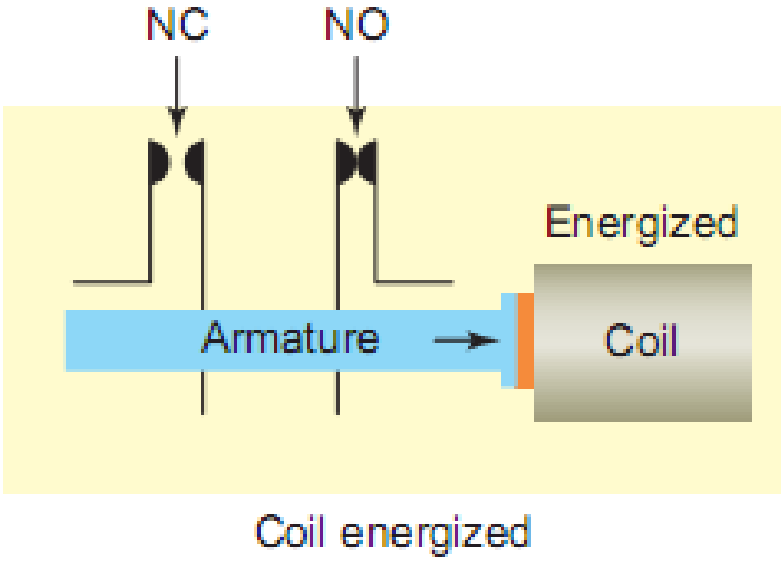
- Electromechanical Relay (EMR) is a switch operated by an electromagnet.

- EMR consists of two circuits:

1) The Input /Coil /Control Circuit
2) The Output / Load /Power Circuit

Relay Operation





Relay Operation

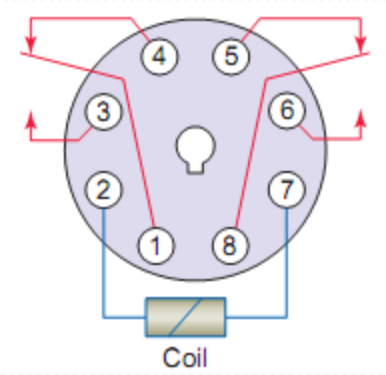
- When the coil is energized, it produces an electromagnetic field.
- Action of this field, in turn, causes the armature to move, closing the NO contacts and opening the NC contacts.
- The distance that the plunger moves is generally short—about ¼ inch or less.

- Normally open contacts are open when no current flows through the coil but closed as soon as the coil conducts a current or is energized.

- Normally closed contacts are closed when the coil is deenergized and open when the coil is energized.

Relay Applications

- Relays are used to control small loads of small electrical signal(0-15 A & 220/480V)



Application #1

- It desired to control the temperature the of the an oven as follows:
- Position A

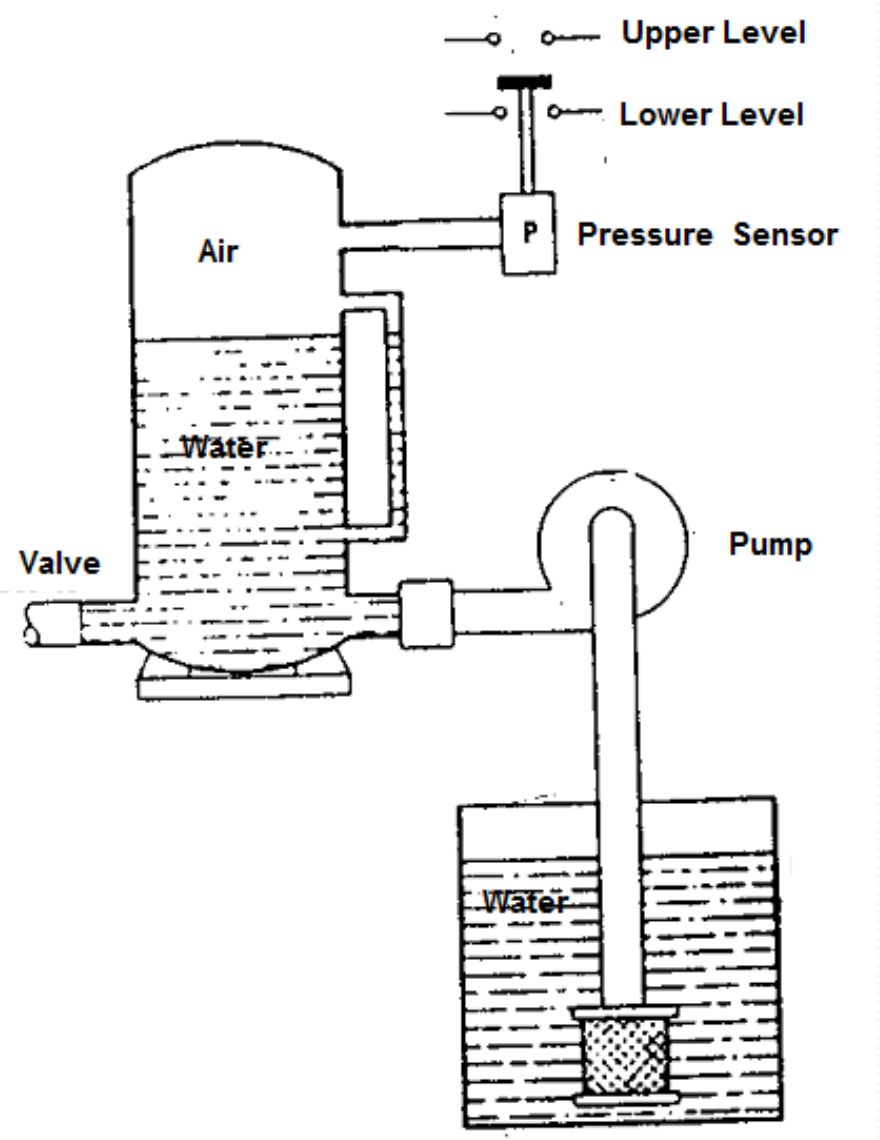
1) when the temperature exceeds the setting value the cooling fans start running
2) when the temperature drops below the setting value the cooling fans stop running

- Position M

the cooling fans run manually without the temperature sensor with start and stop PB.

Application #2

- when the pressure reaches The lower level the pump runs and continues running till the pressure reaches the upper limit.
- when the pressure reaches the Upper limit the pump stops running and so on .



Application #3

- It is desired to control the operation of the pump in the previous application using a selector of 2 positions

1) **Position M:** the pump operates manually without the pressure sensor with start and stop PB.
2) **Position A:** the pump operates automatically with the pressure sensor.

Application #4

- when the water level reaches B2the pump runs and continues running till the water level reaches B1
- when the water level reaches B1 the pump stops running and does not run till the water level reaches B2 and so on .
- B1 & B2 have normally open contacts