

Switching apparatus

A switch is an electrical component that can break an electrical circuit, interrupting the current or diverting it from one conductor to another. The most familiar form of switch is a manually operated electromechanical device with one or more sets of electrical contacts. Each set of contacts can be in one of two states: closed, meaning the contacts are touching and electricity can flow between them, or *open*, meaning the contacts are separated and non-conducting.

A switch may be directly manipulated by a human as a control signal to a system, such as a computer keyboard button, or to control power flow in a circuit, such as a light switch. Automatically-operated switches can be used to control the motions of machines, for example, to indicate that a garage door has reached its full open position or that a machine tool is in a position to accept another workpiece. Switches may be operated by process variables such as pressure, temperature, flow, current, voltage, and force, acting as sensors in a process and used to automatically control a system. For example, a thermostat is an automatically-operated switch used to control a heating process. A switch that is operated by another electrical circuit is called a relay. Large switches may be remotely operated by a motor drive mechanism. Some switches are used to isolate electric power from a system, providing a visible point of isolation that can be pad-locked if necessary to prevent accidental operation of a machine during maintenance, or to prevent electric shock.

Many types and classifications of switches have been developed. A common designation is by the number of poles, throws and position they have.

Contacts

In the simplest case, a switch has two pieces of metal called contacts that touch to make a circuit, and separate to break the circuit. The contact material is chosen for its resistance to corrosion, because most metals form insulating oxides that would prevent the switch from working. Contact materials are also chosen on the basis of electrical conductivity, hardness, mechanical strength, low cost and low toxicity.

Sometimes the contacts are plated with noble metals.

In addition to the previously mentioned switches, electronic switches such as mechanical relay and semiconductor devices such as thyristor or transistor are also being used. Special applications require special switches like mercury tilt switch, reed switch and so on.

The mercury switch consists of a drop of mercury inside a glass bulb with 2 or more contacts. The two contacts pass through the glass, and are connected by the mercury when the bulb is tilted to make the mercury roll on to them.

Arcs

When the wattage being switched is sufficiently large, the electron flow across opening switch contacts is sufficient to ionize the air molecules across the tiny gap between the contacts as the switch is opened, forming a gas plasma, also known as an electric arc. The plasma is of low resistance and is able to sustain power flow, even with the separation

distance between the switch contacts steadily increasing. The plasma is also very hot and is capable of eroding the metal surfaces of the switch contacts.

Extremely large switches in excess of 100,000 watts capacity often have switch contacts surrounded by something other than air to more rapidly extinguish the arc. For example, the switch contacts may operate in a vacuum, or immersed in mineral oil.

Examples of household switches

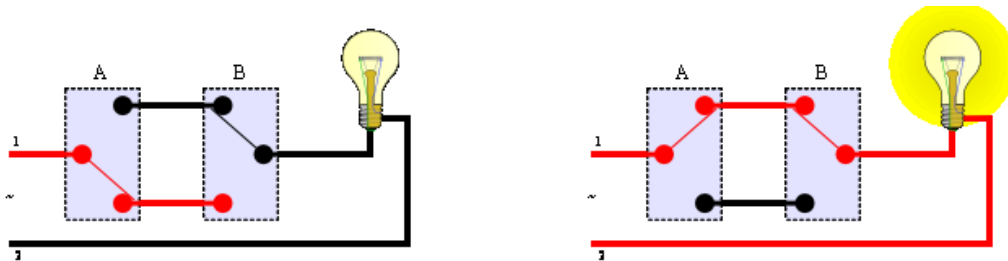
A simple on-off switch: The two terminals are either connected together or disconnected from each other.	A double pole and single throw on-off switch.	A single pole changeover switch for two electric circuits.	A double pole changeover switch for two electric circuits.	A switch internally wired for polarity-reversal applications (called also cross-switch).

Switch controlling a light bulb

A, B = independent two-way switches

1, 2 = supply of electric energy, red color represents hot wire

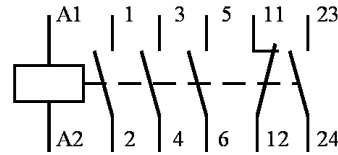
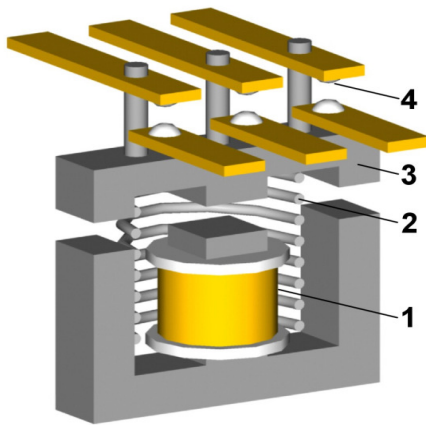
Light bulb can be independently switched on from two separate places (A and B).



Contactor

A contactor is an electrically controlled switch used for switching a power circuit, similar to relay except with higher amperage ratings. A contactor is controlled by a circuit which has a much lower power level than the switched circuit. Contactors come in many forms with varying capacities and features. Unlike a circuit breaker, a contactor is not intended to interrupt a short circuit current.





1. coil with core,
2. spring retraction,
3. armature,
4. thrust switching contact

Applications:

- Contactors are often used to provide central control of large lighting installations, such as an office building or retail building.
- A magnetic starter is a contactor designed to provide power to electric motors.

Switchgear

The term switchgear, used in association with the electric power system, or grid, refers to the combination of electrical disconnects, fuses and/or circuit breakers used to isolate electrical equipment.

One of the basic functions of switchgear is protection, which is interruption of short-circuit and overload fault currents while maintaining service to unaffected circuits. Switchgear also provides isolation of circuits from power supplies. Switchgear is also used to enhance system availability by allowing more than one source to feed a load.



VOCABULARY

noble metal – ušľachtilý kov
 interrupting – prerušenie
 diverting – presmeovanie
 relay – relé
 contactor – stýkač
 mercury tild switch – ortuťový spínač
 switchgear – výkonový vypínač
 maintaining – udržiavanie
 unaffected – nedotknutý
 to enhance – k posilneniu
 to feed a load – *tu*: napájať

arc – elektrický oblúk
 to sustain – k udržaniu
 steadily – stále
 to sustain power flow – udržať tok energie
 extinguish – uhasiť
 immersed – ponorený
 eroding – narúša
 similar – podobný
 varying – rôzne
 availability – dostupnosť
 unlike – na rozdiel od, nepodobný
 retail – obchodné

