

Electrical Switches

A "switch" is a device that allows you to open and close an electric circuit. This lets you turn something on or off, or select one of several choices. Basic electronic components don't get much simpler than a switch, but there are wide assortment of different switches out there, for every possible need.

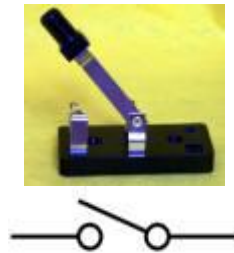
The most basic switch is two pieces of wire coming together. When you touch the wires together, electricity can pass from one to the other, completing the electric circuit. When you pull the wires apart, the circuit is broken.

Definitions used when describing switches

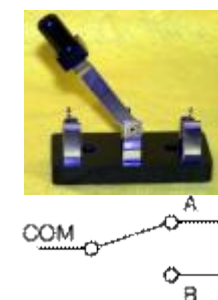
Simple Switches

Explanations of some basic switches. Knife switch images are used to visually illustrate the idea of poles and throws.

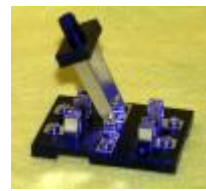
The simplest of switches is an **SPST** switch. The photo to the right is a knife switch that is an SPST switch. It can make one connection (Single Pole) in one direction (Single Throw). Imagine a wire connected to the terminal in the middle of the switch and another wire connected to the terminal on the left side of the switch. When the knife is pushed into the terminal on the left side the circuit is completed. The light switch in your bedroom is probably a SPST throw switch. The circuit symbol for a SPST switch is shown below the picture of the knife switch.



The next type of switch is a **SPDT** switch. This is a **Single Pole Double Throw** Switch. The knife switch on the right is an example of a SPDT switch. Again imagine a wire connecting to the center terminal of the switch (Single Pole). The knife could be thrown to either of the 2 sides of the switch (Double Throw). The circuit symbol for a SPDT throw switch is:



The photos on the right are photos of a DPST (Double Pole Single Throw) Switch and a DPDT (Double Pole Double Throw) Switch.



It is important for a team to understand the DPDT switch because a DPDT switch can be wired so that it can reverse the direction a DC motor is turning. The image at the right shows how to wire a DPDT switch as a reversing switch. The power feeds (red line + and black line -) are cross wired to the two "throws" of the switch. The motor leads (blue wires) are connected to the common terminals in the center of the switch. This allows the switch to reverse the polarity of the power going to the motor.

There is a solid state device that works similar to a DPDT switch wired as a reversing switch. It is called an "H-Bridge". It is often used in electronic motor control circuitry. Teams can find tutorials on the H Bridge by doing a google search.

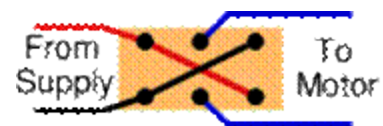


photo of dpdt knife switch wired as a reversing switch

Momentary Switches: Some switches are classified as Momentary. A momentary switch is switch that is only "working" when the user is activating it – usually by pressing on a button. Momentary switches can be either "normally closed" or "normally open" switches. With a normally open switch the circuit is open until the user pushes the button. An example of a normally open switch would be your front door bell button. With a "normally closed" switch the circuit is complete (or closed) until the user pushes the button. An example of a normally closed switch would be the switch that controls the light in you refrigerator when you open the door. When the door is closed the button is pushed and the circuit opens thus turning off the light (at least I think it goes out). When the refrigerator door is opened the button is no longer being pushed so the light turns on.



Click for a chart showing additional [types of switches](#)

Switch actuator type

Switch actuator refers to the type of mechanical action required to to activate a switch. Actuator types can include toggle, pushbutton, slide and magnetic. [List of most common switch actuator types.](#)

Switch Contact Ratings

One of the things you must consider when purchasing a switch is the amount of voltage and current (amps) that you will be controlling with the switch. Most of the time the packaging for the switch will include information on the maximum voltage and amperage that the switch is rated for. If you are working with smaller DC hobby type motors and light then most switches that you can purchase at your local electronics store are more than adequate although there are some smaller reed (magnetic) switches that may not be rated for even the small loads of the hobby motors and lights. The important thing is to read the labels and use switches that are rated at or above the voltage and amperage loads of your circuit. As you start using more powerful motors and other devices that use 6 Volts or more of electricity you will have to look more carefully for switches that meet your requirements.

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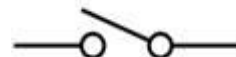
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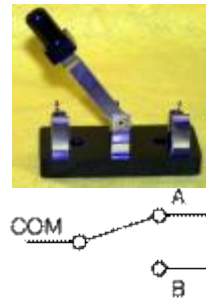
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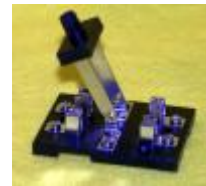
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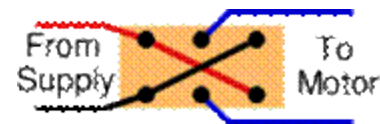


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