

Electric current

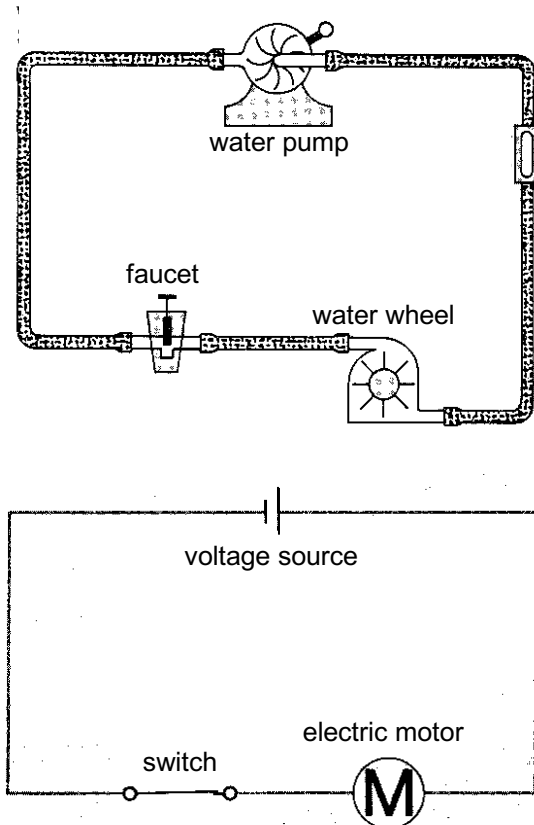
Electric current is a means of transportation for energy

Introduction

We compare a water circuit (upper picture) to an electric circuit (lower picture). In the water circuit the water pump is pumping the water round the circuit. While water is being pushed out on one side of the pump, at the same time the same amount of water enters the pump on the other side. The water pump corresponds to the voltage source in an electric circuit, which moves the electrons around the circuit - again, as electrons are being pushed out of the battery at one pole, the same amount of electrons enter the battery at the other pole.

By pumping water about the circuit energy can be transported from the pump to the water wheel (which could be used for grinding wheat for instance); the moving water makes the wheel turn. In the same way, an electric motor starts turning as the electrons pass through it.

The flow of water can be interrupted by a water faucet. By blocking the hose, the water can no longer move - no more energy is being transported and the water wheel stops turning. In the same way the motion of the electrons can be stopped by opening the electric circuit with a switch. The electrons stop moving and the motor stops running.



from: Physik für die Sekundarstufe I, Cornelsen Orell Füssli, p. 206

The electric circuit

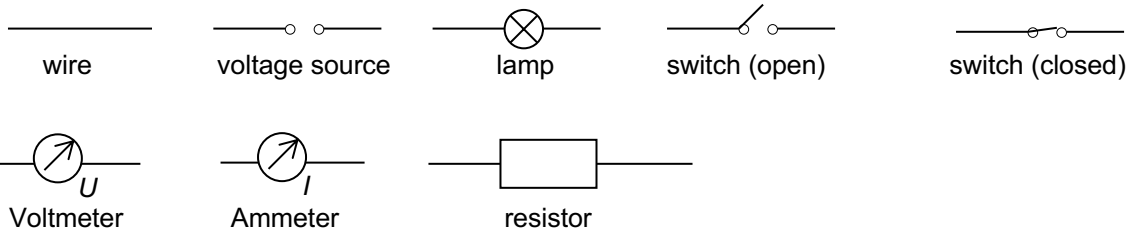
Requirements for an electric current to flow in a circuit:

- ☞ there must be a voltage source
- ☞ there must be a closed conducting loop

If these requirements are met energy will be transported from the source (e.g. battery, electric outlet) to the consumer (e.g. lamp, motor).

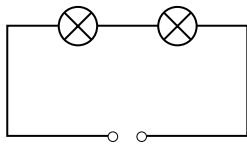
Circuit diagrams: Graphical representation of an electric circuit

An electric circuit can be depicted by a circuit diagram. Each part of the circuit is represented by a symbol:

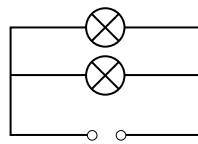


Parallel circuit and series circuit

Several consumers (e.g. lamps) can be connected to one voltage source in an electric circuit. There are different ways of doing this:



Series circuit: All lamps share the same conducting loop. If one lamp is unscrewed from the socket (thus interrupting the flow of charge through this lamp), all lamps will go out.



Parallel circuit: Each lamp has its own conducting loop and its own connection to the voltage source. If one lamp is unscrewed from the socket (thus interrupting the flow of charge through this lamp), only the unscrewed lamp will go out.