

## ELECTRIC CURRENT

In Electric current the electric refers to electricity and the current refers to flow of electrical charge.

### Examples

Lightning is an example of an electric current, as is the solar wind, the source of the polar aurora. Probably the most familiar form of electric current is the flow of conduction electrons in a metallic wire. This is how utility companies deliver electricity. In electronics, electric current is most often the flow of electrons through conductors and devices such as resistors, but it is also the flow of ions inside a battery or the flow of holes within a semiconductor.

### Relation between current and charge

The symbol typically used for the amount of current (the amount of charge  $Q$  flowing per unit of time  $t$ ) is  $I$ , from the German word Intensität, which means 'intensity'.

$$I = \frac{dQ}{dt}$$

Formally this is written as

$$i(t) = \frac{dq(t)}{dt} \text{ or inversely as } q(t) = \int_{-\infty}^t i(x) dx$$

### Conventional current

Conventional current was defined early in the history of electrical science as a flow of positive charge. In solid metals, like wires, the positive charges are immobile, and only

the negatively charged electrons flow in the direction opposite conventional current, but this is not the case in most non-metallic conductors. In other materials, charged particles flow in both directions at the same time. Electric currents in electrolytes are flows of electrically charged atoms (ions), which exist in both positive and negative varieties. For example, an electrochemical cell may be constructed with salt water (a solution of sodium chloride) on one side of a membrane and pure water on the other. The membrane lets the positive sodium ions pass, but not the negative chlorine ions, so a net current results. Electric currents in plasma are flows of electrons as well as positive and negative ions. In ice and in certain solid electrolytes, flowing protons constitute the electric current. To simplify this situation, the original definition of conventional current still stands.

There are also instances where the electrons are the charge that is physically moving, but where it makes more sense to think of the current as the movement of positive "holes" (the spots that should have an electron to make the conductor neutral). This is the case in a p-type semiconductor.

The SI unit of electrical current is the ampere. Electric current is therefore sometimes informally referred to as amperage or ampage, by analogy with the term voltage. Though this is a valid term, some engineers frown on it.

Source : [http://engineering.wikia.com/wiki/Electric\\_current](http://engineering.wikia.com/wiki/Electric_current)