Summary lesson 2. Electricity

Voltage (sometimes also called electric potential difference or electrical tension) is the electrical potential difference between two points of an electrical or electronic circuit, expressed in **volts**.

Electric current is the flow of electrical charge. The amount of electric charges flowing through a section in a second. The SI unit of electric current is the **ampere**.

Electrical resistance is a measurement of the difficulty encountered by a power source in forcing electric current through an electrical circuit, and hence the amount of power dissipated in the circuit. Resistance is measured in **ohms** (Ω).

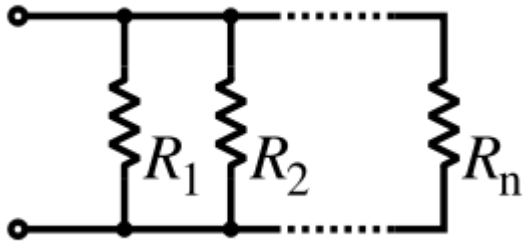
Ohm's law.

The direct current flowing in an electrical circuit is directly proportional to the voltage applied to the circuit. The constant of proportionality R, called the electrical resistance, is given by the equation below,

$V = I \cdot R$ in which V is the applied voltage and I is the current.

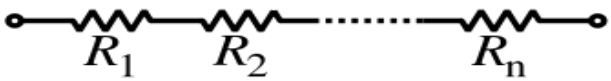
Series and Paralel resistors

Resistors in a parallel: In this configuration each resistor have the same voltage. To find their total equivalent resistance (Req):



$$\frac{1}{R_{eq}} = \frac{1}{R1} + \frac{1}{R2} + ... + \frac{1}{Rn}$$

Resistor in Series: the current through resistors in series stays the same, but the voltage across each resistor can be different. The sum of the potential differences (voltage) is equal to the total voltage. To find their total resistance:



$$R_{eq} = R1 + R2 + ... + Rn$$

The practical application to resistors is that a resistance of any non-standard value can be obtained by connecting standard values in series or in parallel.

Summary lesson 2. Electricity

Kinds of electrical current

Direct current (DC).

Direct current (DC) is the unidirectional flow of electric charge. In direct current, the electric charges flow in a constant direction, distinguishing it from alternating current (AC).

Alternating current (AC).

An alternating current (AC) is an electric current whose direction reverses cyclically, as opposed to direct current, whose direction remains constant.

An AC voltage v can be described mathematically as a function of time by the following equation:

$$v(t) = V_{peak} \sin(\omega \cdot t)$$

ω is the angular frequency (unit: radians per second) $\omega = 2\pi f$; f is the physical frequency which represents the number of oscillations per second (unit = hertz). In Galicia, and practically all the countries, the frecuency f = 50 Hz.

A root mean square (RMS) of voltage is $V_{RMS} = \frac{V_{peak}}{\sqrt{2}}$. The V_{RMS} means that the time-averaged power delivered is equivalent to the power delivered by a DC voltage of V_{RMS}.