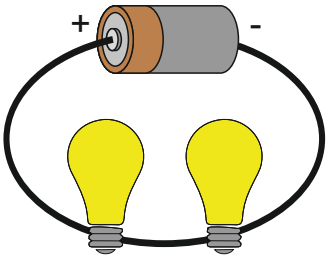
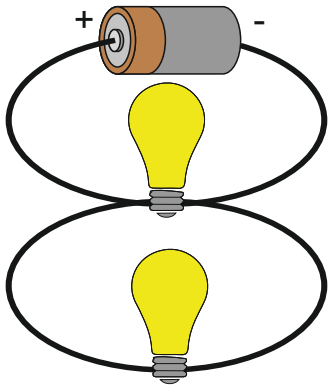
SERIES CIRCUIT



Battery voltage
In a series circuit the battery voltage should be equivalent to and not greater than the **SUM** of the bulb voltages, providing all the bulbs are of the same voltage.
E.g. Two 1.5V bulbs would need a 3V battery.

NOTE You cannot isolate a bulb in this type of circuit i.e. If one bulb blows, all the lights will go out (think Christmas lights....).
This circuit is only useful for connecting a very small number of bulbs.

PARALLEL CIRCUIT

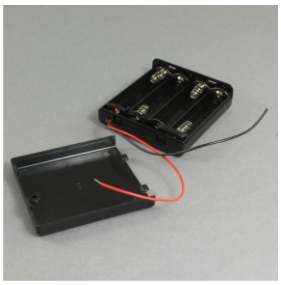


Battery voltage
In a parallel circuit the battery voltage should be equivalent to and never greater than the **voltage of an individual bulb** providing all bulbs are of the same voltage.

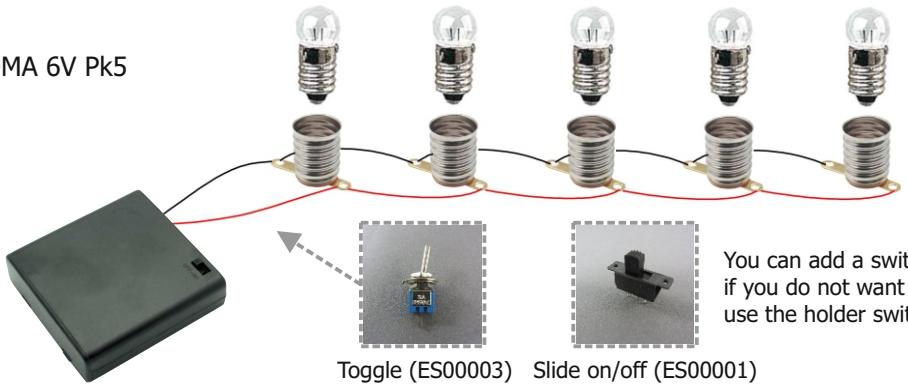
E.g. Any number of 1.5V bulbs can be connected in parallel, requiring only a 1.5V battery (useful for connecting a large number of bulbs in one circuit).

NOTE A higher voltage battery could potentially damage the bulbs.
A lower battery voltage (than total bulb voltage) can be used - but may cause a slightly dimmer glow.

CONNECTING MES BULBS



Example:
Bulb MES 100MA 6V Pk5
(EU10059)



Recommended:
In a parallel circuit 4 AA batteries will power the whole circuit. This holder (EB20010) comes with a switch.

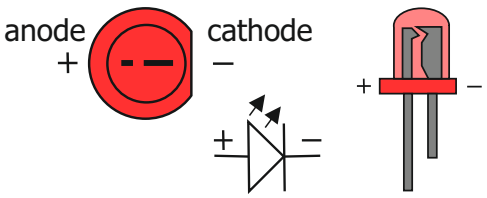
Toggle (ES00003)

Slide on/off (ES00001)

You can add a switch if you do not want to use the holder switch

LED - LIGHT EMITTING DIODE

Advantages over incandescent light sources:
- **Efficiency**: they emit more light per watt than with incandescent bulbs.
- **Longer lifetime**: they tend to slowly dim over time, rather than the abrupt failure of incandescent bulbs.
- **Size**: can be very small (smaller than 2mm).



BASIC DEFINITIONS

- **Voltage**: the force that pushes an electrical current. (E.M.F. Electro-motive force) — UNITS= volts= V
- **Current**: the flow of electrons around a closed circuit — UNITS= amps= I
- **Resistance**: the property of a material to restrict the flow of an electrical current — UNITS= Ohms = Ω/R