

Viso

ELECTRONICS PROJECT ①

Electronic Components Fact Sheet

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Diodes



Function

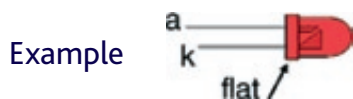
Diodes allow electricity to flow in only one direction. The arrow of the circuit symbol shows the direction in which the current can flow.

Diodes are the electrical version of a valve and early diodes were actually called valves.

Connecting and soldering

Diodes must be connected the correct way round, the diagram may be labelled **a** or **+** for anode and **k** or **-** for cathode. The cathode is marked by a line painted on the body. Diodes are labelled with their code in small print.

Light-Emitting Diodes (LEDs)



Function

LEDs emit light when an electric current passes through them

Connecting and soldering

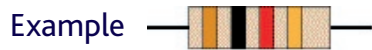
LEDs must be connected the correct way round, the diagram may be labelled **a** or **+** for anode and **k** or **-** for cathode. The cathode is the short lead and there may be a slight flat on the body of round LEDs. If you can see inside the LED the cathode is the larger electrode.

LEDs can be damaged by heat when soldering, but the risk is small unless you are very slow. No special precautions are needed for soldering most LEDs.

Advantages

- Come in many colours
- Require less current than a bulb so more efficient
- Small component

Resistors



Function

Resistors restrict the flow of electric current, for example a resistor is placed in series with a light-emitting diode (LED) to limit the current passing through the LED.

Connecting and soldering

Resistors may be connected either way round. They are not damaged by heat when soldering.

Variable Resistors

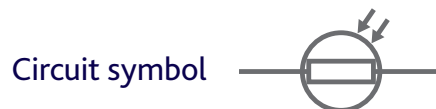


The variable resistor is a resistor whose value can be adjusted by turning a shaft or sliding a control. They are also called potentiometers or rheostats and allow the resistance of the device to be altered by hand.

Function

Adjusting lamp brightness, adjusting motor speed, and adjusting the rate of flow of charge into a capacitor in a timing circuit.

Transducers



A transducer is a device that converts one type of energy to another for the purpose of measurement or information transfer. Most transducers are either sensors or actuators. A transducer is sometimes defined as any device that senses or converts a signal from one form to another.

Function

A transducer which converts brightness (light) to resistance (an electrical property).

Cell

Example



Circuit symbol



Function

Supplies electrical energy.

The larger terminal (on the left) is positive (+).

A single cell is often called a battery, but strictly a battery is two or more cells joined together.

The cells in a battery can be connected in parallel, series, or in both. A parallel combination of cells has the same voltage as a single cell, but can supply a higher current (the sum of the currents from all the cells).

A series combination has the same current rating as a single cell but its voltage is the sum of the voltages of all the cells.

Push switch

Example



Circuit symbol



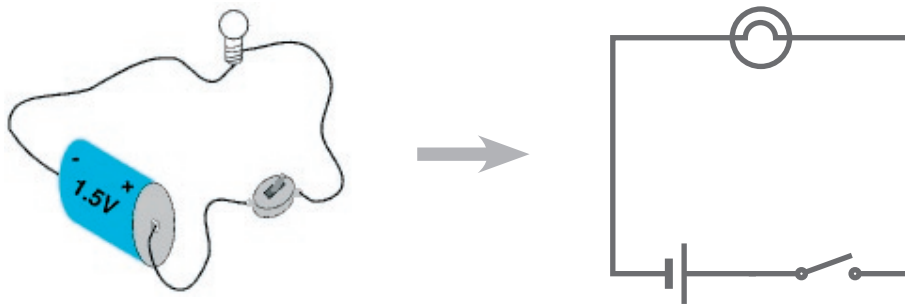
Function

A push switch allows current to flow only when the button is pressed. This is the switch used to operate a doorbell.

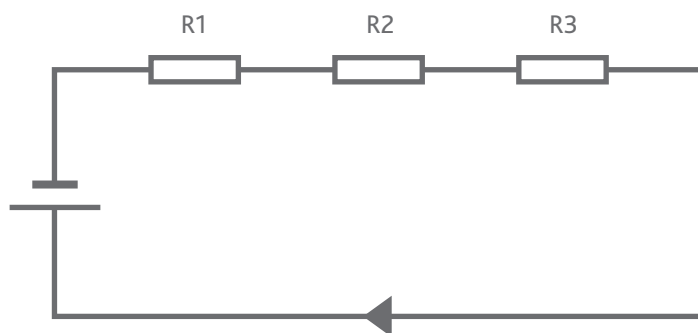
Soldering

- ⚠ Never touch the element or tip of the soldering iron.**
They are very hot (about 400°C) and will give you a nasty burn.
- ⚠ Take great care to avoid touching the mains flex with the tip of the iron.**
The iron should have a heatproof flex for extra protection. An ordinary plastic flex will melt immediately if touched by a hot iron and there is a serious risk of burns and electric shock.
- ⚠ Always return the soldering iron to its stand when not in use.**
Never put it down on your workbench, even for a moment!
- ⚠ Work in a well-ventilated area.**
The smoke formed as you melt solder is mostly from the flux and quite irritating. Avoid breathing it by keeping your head to the side of, not above, your work.
- ⚠ Wash your hands after using solder.**
Solder contains lead which is a poisonous metal.

Series Circuits



A series circuit is a circuit which resistors are arranged in a chain, so the current has only one path to take. The current is the same through each resistor. The total resistance of the circuit is found by simply adding up the resistance values of all the individual resistors

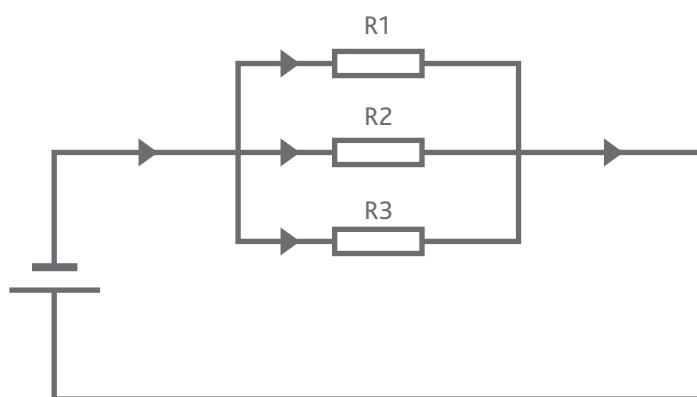


Resistors in series

$$R = R1 + R2 + R3$$

Parallel Circuits

Here is a parallel circuit diagram. In this case the current supplied by the battery splits up, and the amount going through each resistor depends on the resistance.



Resistors in parallel

$R1 = 8$ ohms, $R2 = 8$ ohms, $R3 = 4$ ohms

To calculate the resistance the formula is:

$$1/R = 1/R + 1/R + 1/R$$

$$1/R = 1/8 + 1/8 + 1/4$$

$$1/R = 1/2$$

$$R = 2$$