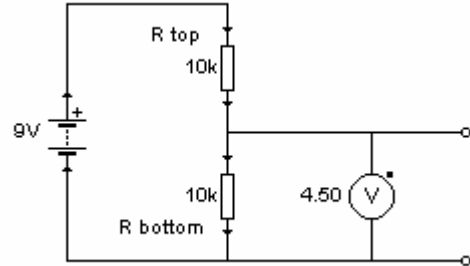


Potential Dividers

A potential divider circuit consists of two components put in series across a voltage source. They divide the voltage into smaller parts.

In the diagram two resistors are in series across a battery. They divide the 9 volts of the battery so that the output voltage is smaller. Here, because the resistors have the same value, they divide the voltage in half. If you use different resistors, or variable resistors, you can get exactly the output voltage you want.



The formula for finding the output voltage is quite simple. Because the current is the same through both resistors, using Ohms Law, we can say:

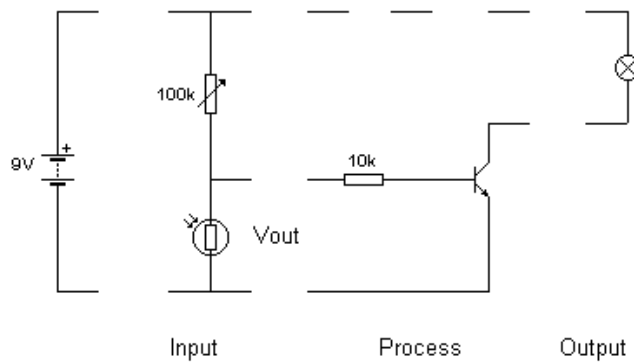
$$\frac{V_{out}}{R_{bottom}} = \frac{V_{in}}{(R_{top} + R_{bottom})} \quad \text{or} \quad V_{out} = \frac{V_{in} \times R_{bottom}}{(R_{top} + R_{bottom})}$$

You can either remember the formula or use ratios for the calculations.

Potential divider circuits can be used with all kinds of sensors for the input to a system including switches, thermistors and light dependent resistors. Switches have a resistance of zero when closed and infinite when open.

Light and heat sensors

The resistance of an LDR falls as the light increases; the resistance of a thermistor falls as the temperature increases. Used at the bottom of a potential divider circuit, the output voltage will also fall as the sensor's resistance falls.



Used at the top of a potential divider, the output voltage will do the opposite – rise as temperature or light increases. The output of the potential divider can be fed to a comparator or to a transistor (via a base resistor). A variable resistor can be used with the sensor to adjust the switching point of the process block.

