



Introduction to Analogue Electronics: Potential Divider



1 What is a potential divider?

A potential divider is an arrangement of resistors that allow an input voltage to be scaled down. This can be useful to provide reference voltages or to scale the output from a sensor.

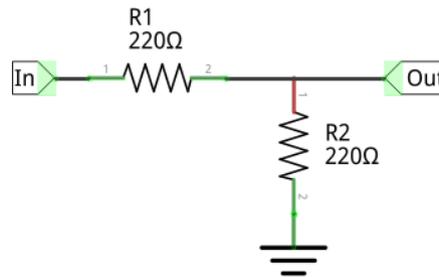


Figure 1: An example potential divider

2 Calculations

The voltage at the output V_{out} is dependent on the input voltage V_{in} and the ratio of the two resistors R_1 and R_2 .

$$V_{out} = V_{in} \times \frac{R_2}{R_1 + R_2} \quad (1)$$

For the example shown above with a $5V$ input, This gives:

$$V_{out} = 5V \times \frac{220}{220 + 220} \quad (2)$$

$$V_{out} = 2.5V \quad (3)$$

Note: This equation is a simplified version that assumes anything connected to V_{out} has a much higher resistance than R_2 (i.e. draws very little current)

3 Examples and Questions

1. What output voltage would be measured for the following combinations:

(a) $V_{in} = 12V$, $R_1 = 1k\Omega$, $R_2 = 4.7k\Omega$ _____

(b) $V_{in} = 5V$, $R_1 = 1\Omega$, $R_2 = 4.7k\Omega$ _____

2. What resistors could you use to get the following output voltages if $V_{in} = 10V$?

(a) $5V$ _____

(b) $8V$ _____