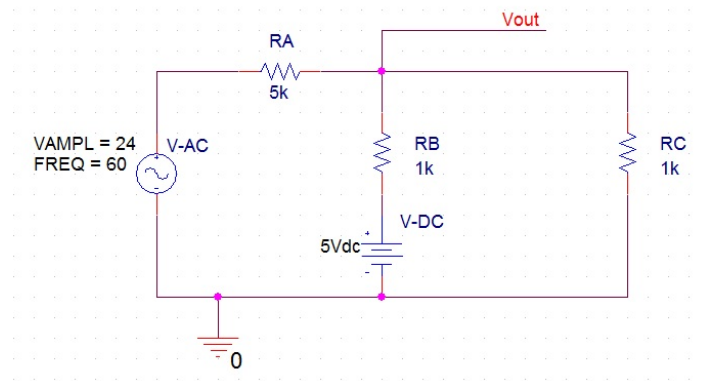


Linear resistive divider circuit – reibot.org



Resistor values above will take an input (Vac) of -24v to 24v and output (Vout) 0v to 5v.

Resistor selection equation

Use this equation to determine the resistors required for your ADC. Vout should not exceed your ADC reference voltage, nor should it drop below zero volts. Check with a calculator for max and min Vac values to make sure everything works.

$$\frac{R_B V_{AC} + R_A V_{DC}}{\frac{R_A R_B}{R_C} + R_A + R_B} = V_{out}$$

Microcontroller's equation

This is the equation that will be running on the micro controller. Once the resistors have been selected the only variable is Vout which is being read by the ADC.

$$\left(\frac{R_A}{R_C} + \frac{R_A}{R_B} + 1\right) V_{out} - \frac{R_A}{R_B} V_{DC} = V_{AC}$$

The equation may be simplified into the standard linear equation once resistor values are selected.

$$y = mx + b$$

$$V_{AC} = mV_{out} + offset$$

Note: Vout is the output of the resistive divider, which will be what's connected to the Arduino's analog input (ADC). Vout should only go from 0-5v. Vac is the input to the overall circuit which may vary from positive to negative voltages. The microcontroller will know the Vout and calculate Vac