
OP Amp Basic Circuits

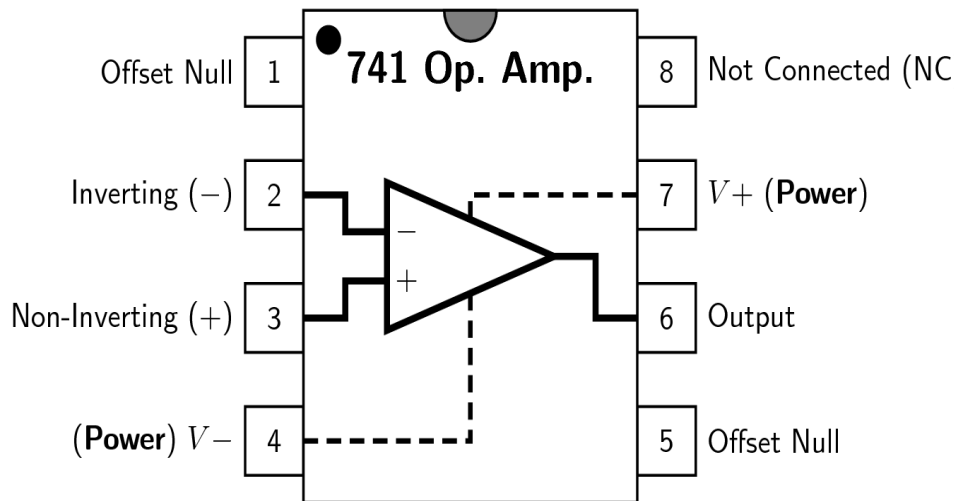
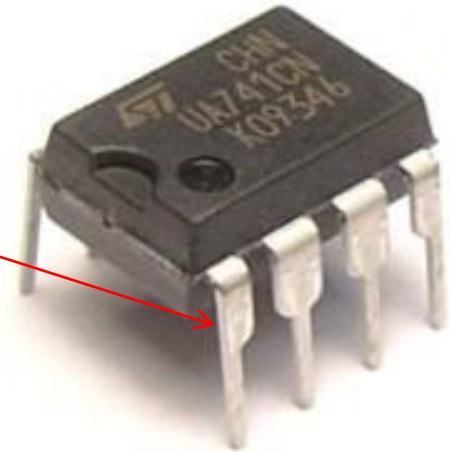
Non-inverting Amplifier

Summing Amplifier

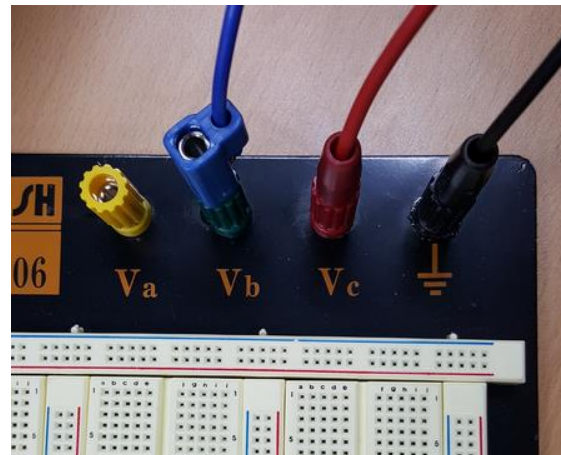
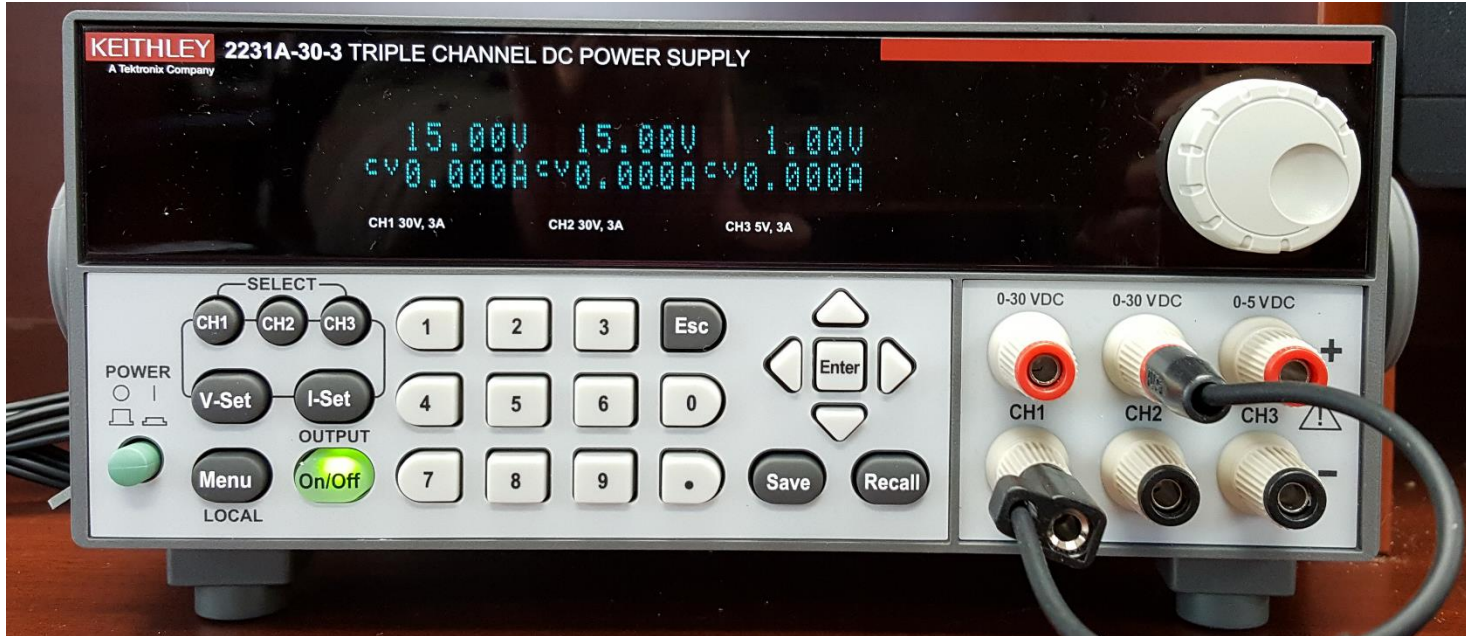
Differential Amplifier

Real OP amp

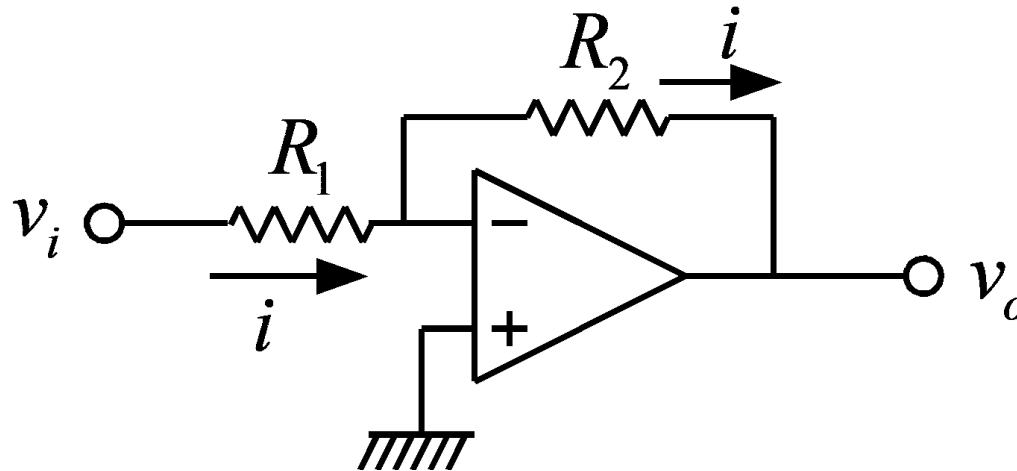
- 1번 핀



Power Supply: +/- 15 Volts



Feedback: Inverting Amplifier

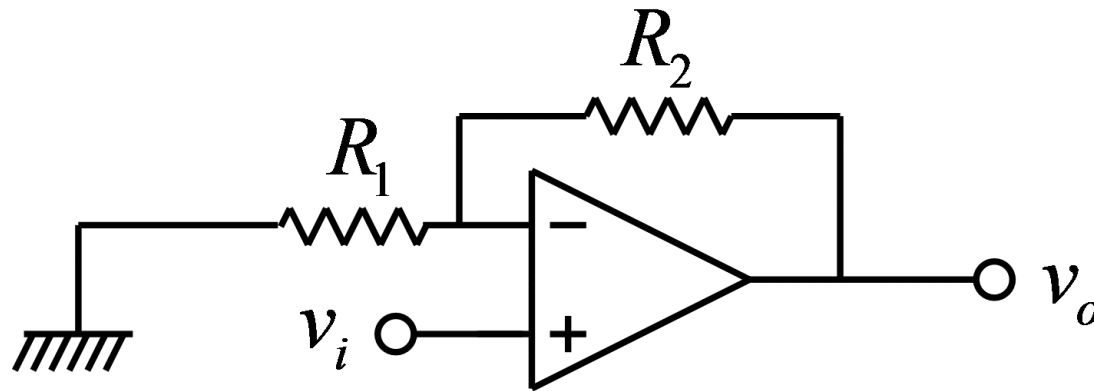


- Virtual ground

$$i = \frac{v_i}{R_1}$$

$$v_o = -R_2 i = -\frac{R_2}{R_1} v_i$$

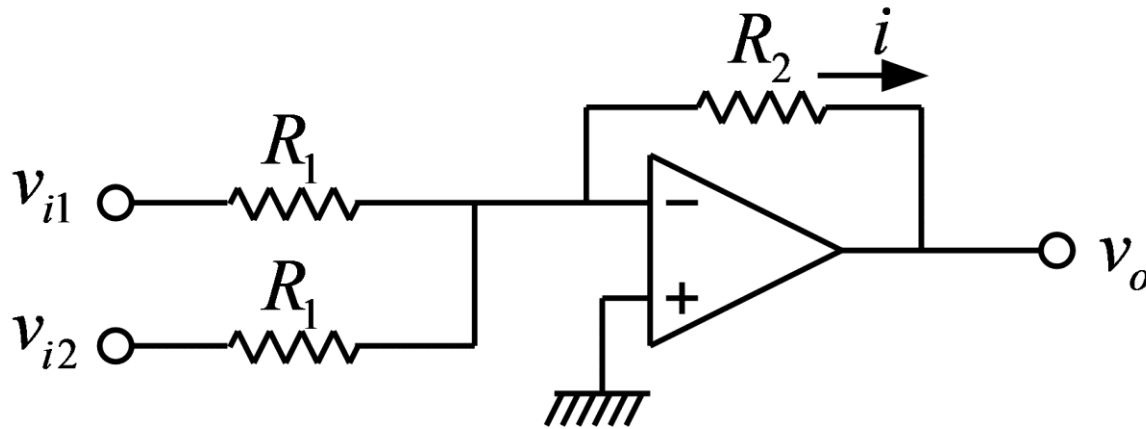
Non-inverting Amplifier



$$v_i = \frac{R_1}{R_1 + R_2} v_o$$

$$v_o = \left(1 + \frac{R_2}{R_1} \right) v_i$$

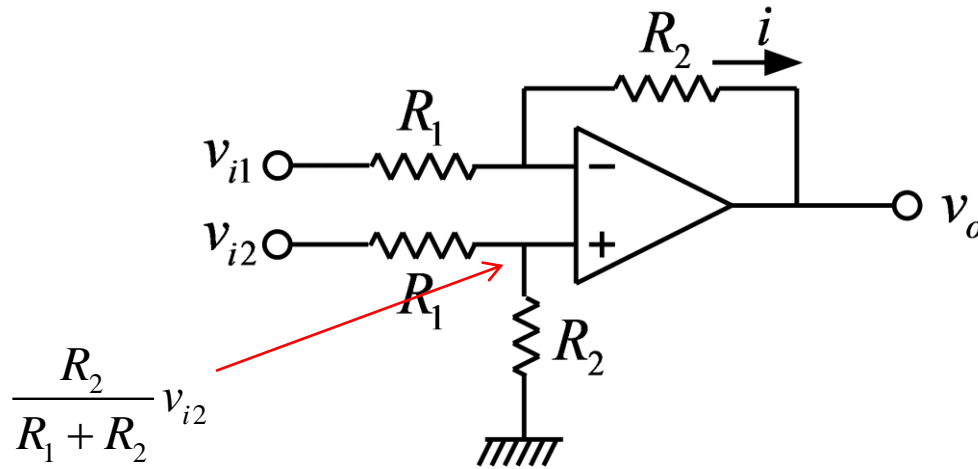
Summing Amplifier



$$i = \frac{v_{i1}}{R_1} + \frac{v_{i2}}{R_1}$$

$$v_o = -R_2 i = -\frac{R_2}{R_1} (v_{i1} + v_{i2})$$

Difference/Differential Amplifier



$$i = \frac{1}{R_1} \left(v_{i1} - \frac{R_2}{R_1 + R_2} v_{i2} \right)$$

$$v_o = \frac{R_2}{R_1 + R_2} v_{i2} - R_2 i = \frac{R_2}{R_1 + R_2} v_{i2} - \frac{R_2}{R_1} \left(v_{i1} - \frac{R_2}{R_1 + R_2} v_{i2} \right) = \frac{R_2}{R_1} (v_{i2} - v_{i1})$$