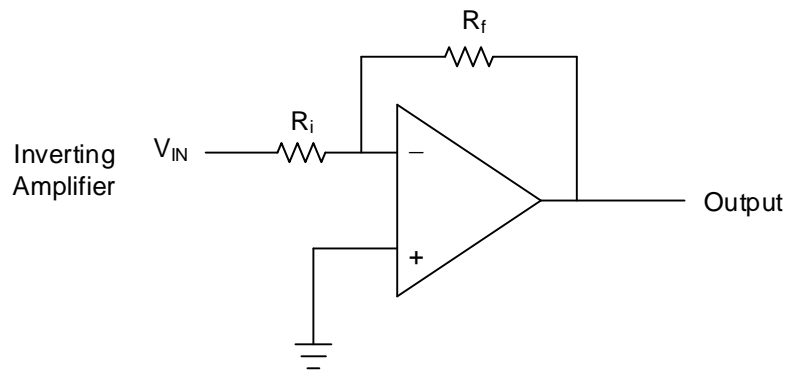
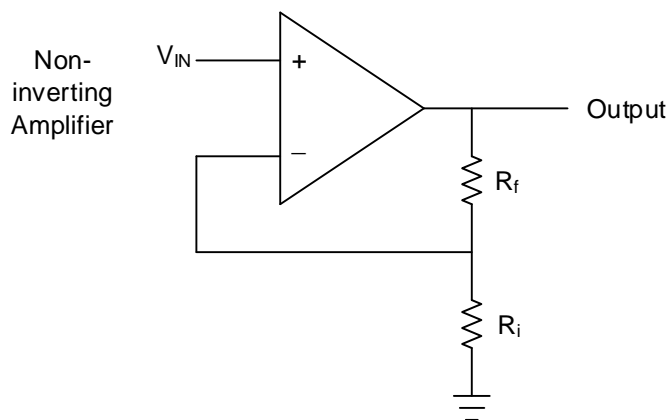
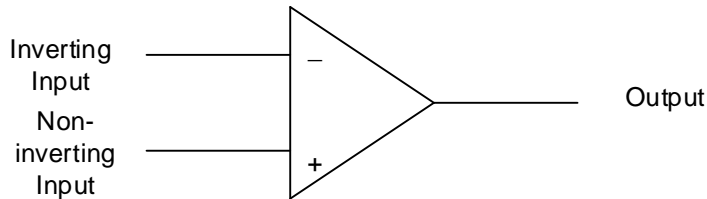


## 12 Semiconductors - Operational Amplifiers

If you are using a signal conditioner device, many times you are using an operational amplifier inside the box. Operational amplifiers are semiconductor devices with the following characteristics:



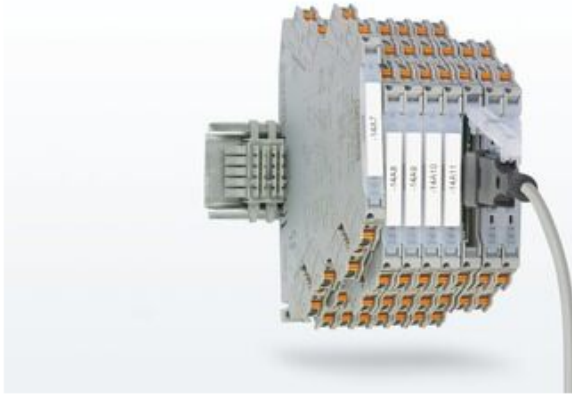
Equation for the non-inverting amplifier:

$$V_{out} = V_{in} \cdot \left(1 + \frac{R_f}{R_{in}}\right)$$

Equation for the inverting amplifier:

$$V_{out} = V_{in} \cdot \left(-\frac{R_f}{R_{in}}\right)$$

# Highly compact signal conditioners with plug-in connection technology



Easier than ever but slim as before

The highly compact MINI Analog Pro signal conditioners offer the easiest installation and startup in a confined space.

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The products on these vendors' sites usually have an op-amp in the inner workings of the design.

Problems:

1. A noninverting op-amp has the following characteristics:

$$R_i = 1.0 \text{ k}\Omega$$

$$R_F = 100 \text{ k}\Omega$$

Find  $V_{in}$  if  $v_{out} = 5 \text{ V}$ .

2. Use google or other search method to find other circuit types using op-amps: