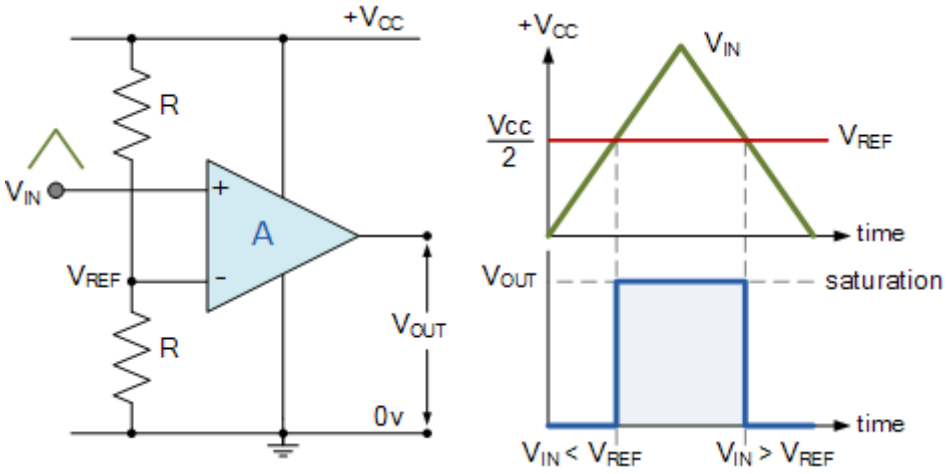
Positive Voltage Comparator

The basic configuration for the positive voltage comparator, also known as a non-inverting comparator circuit detects when the input signal, V_{IN} is ABOVE or more positive than the reference voltage, V_{REF} producing an output at V_{OUT} which is HIGH as shown.

Non-inverting Comparator Circuit



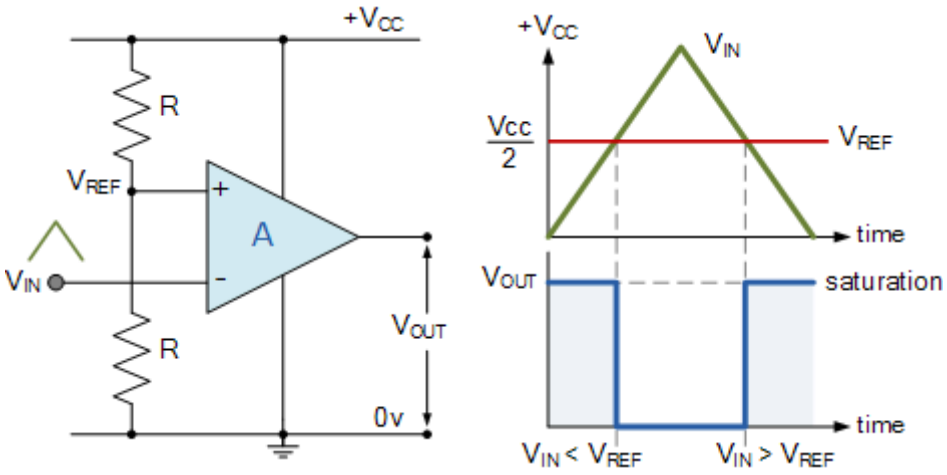
In this non-inverting configuration, the reference voltage is connected to the inverting input of the operational amplifier with the input signal connected to the non-inverting input. To keep things simple, we have assumed that the two resistors forming the potential divider network are equal and: R1 = R2 = R. This will produce a fixed reference voltage which is one half that of the supply voltage, that is Vcc/2, while the input voltage is variable from zero to the supply voltage.

When V_{IN} is greater than V_{REF}, the op-amp comparators output will saturate towards the positive supply rail, Vcc. When V_{IN} is less than V_{REF} the op-amp comparators output will change state and saturate at the negative supply rail, 0v as shown.

Negative Voltage Comparator

The basic configuration for the negative voltage comparator, also known as an inverting comparator circuit detects when the input signal, V_{IN} is BELOW or more negative than the reference voltage, V_{REF} producing an output at V_{OUT} which is HIGH as shown.

Inverting Comparator Circuit



In the inverting configuration, which is the opposite of the positive configuration above, the reference voltage is connected to the non-inverting input of the operational amplifier while the input signal is connected to the inverting input. Then when V_{IN} is less than V_{REF} the op-amp comparators output will saturate towards the positive supply rail, Vcc.

Likewise the reverse is true, when V_{IN} is greater than V_{REF}, the op-amp comparators output will change state and saturate towards the negative supply rail, 0v.

Then depending upon which op-amp inputs we use for the signal and the reference voltage, we can produce an inverting or non-inverting output. We can take this idea of detecting either a negative or positive going signal one step further by combining the two op-amp comparator circuits above to produce a window comparator circuit.