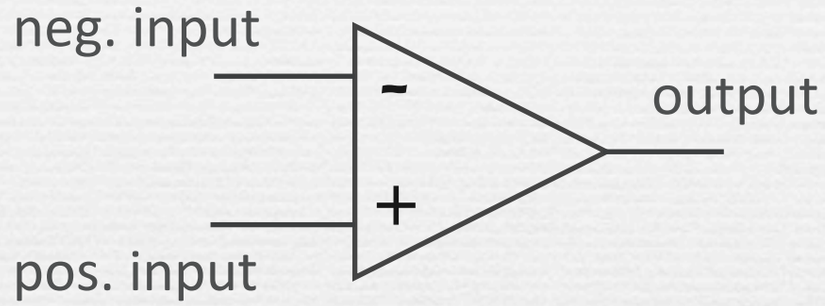
Operational amplifiers

An OPAMP is an **ideal** electronic building block:

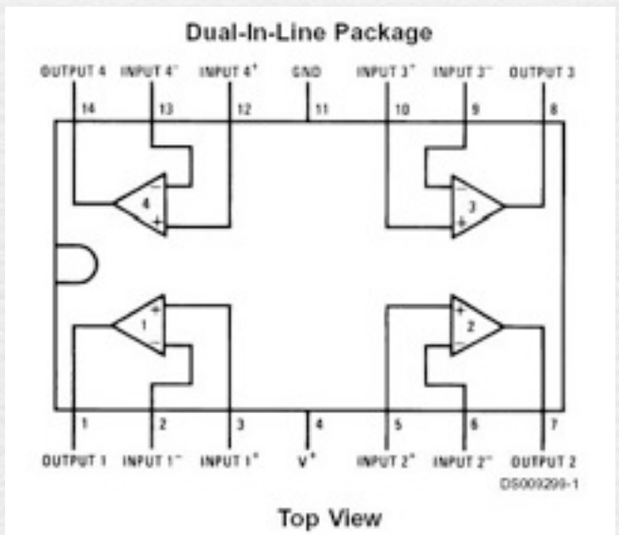
1. The opamp has a very high amplification (infinite)

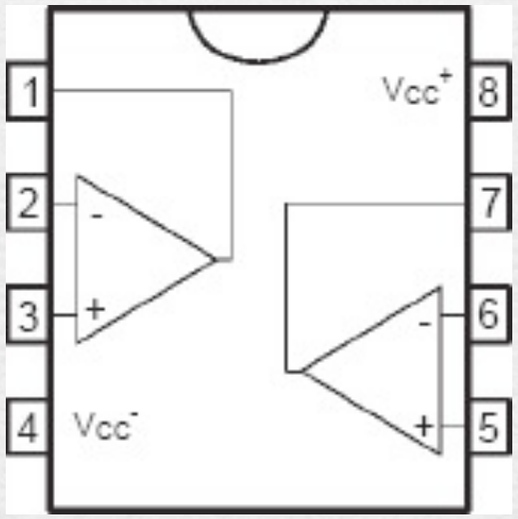


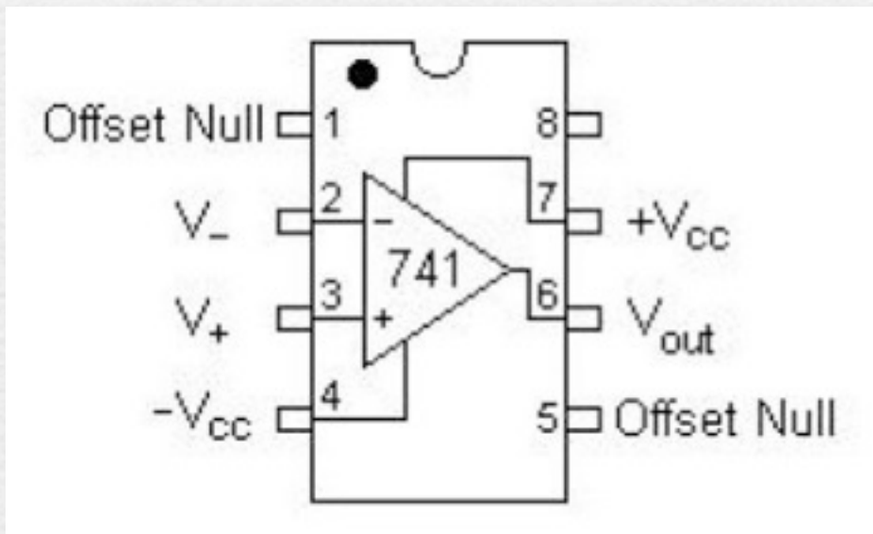
2. The input impedance (resistance) is very high ... so the input-current is incredibly low!

3. The output impedance is very low ... so the opamp can deliver high currents

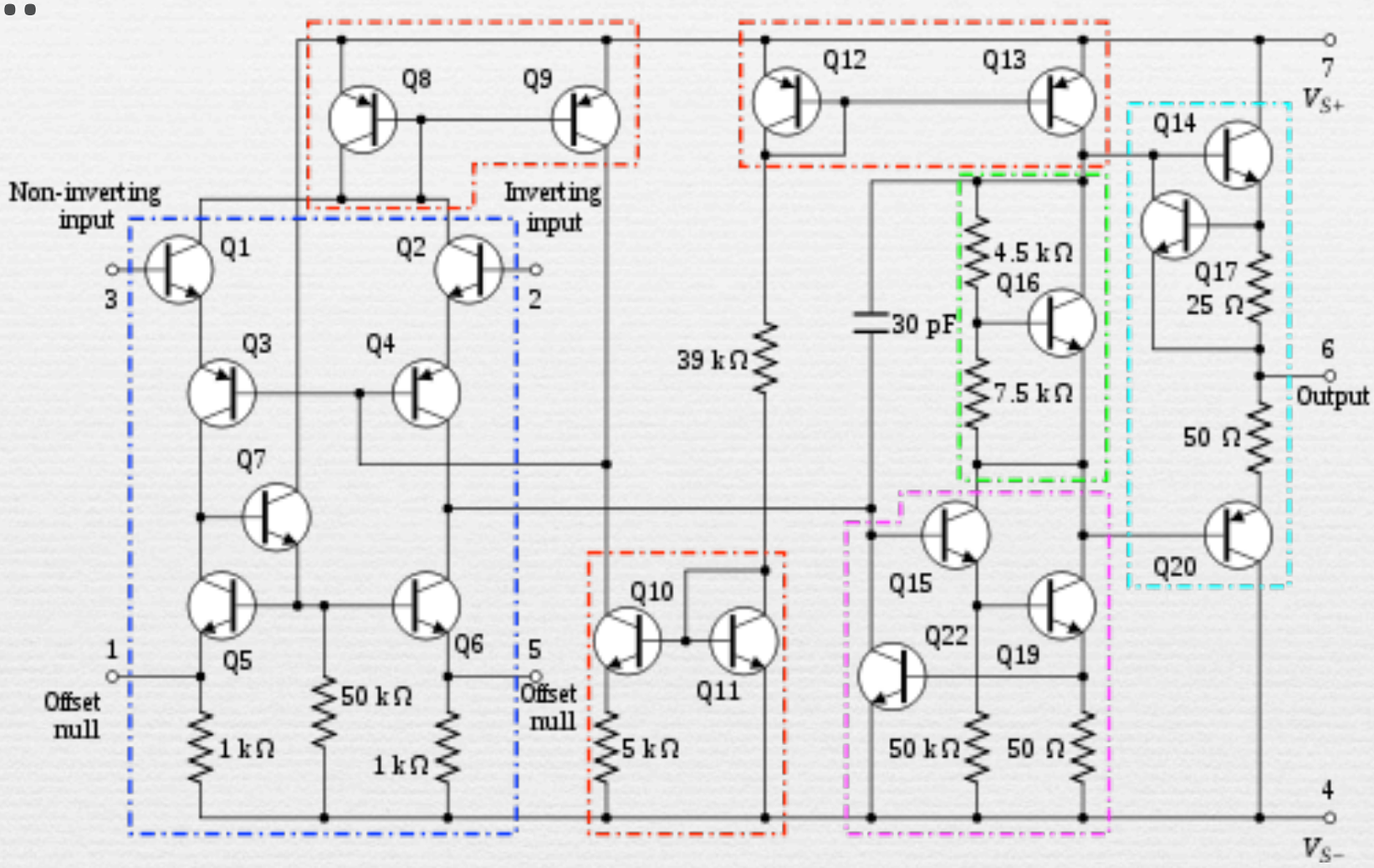
Package and pin-out







Inside the Opamp ...



OPAMPS

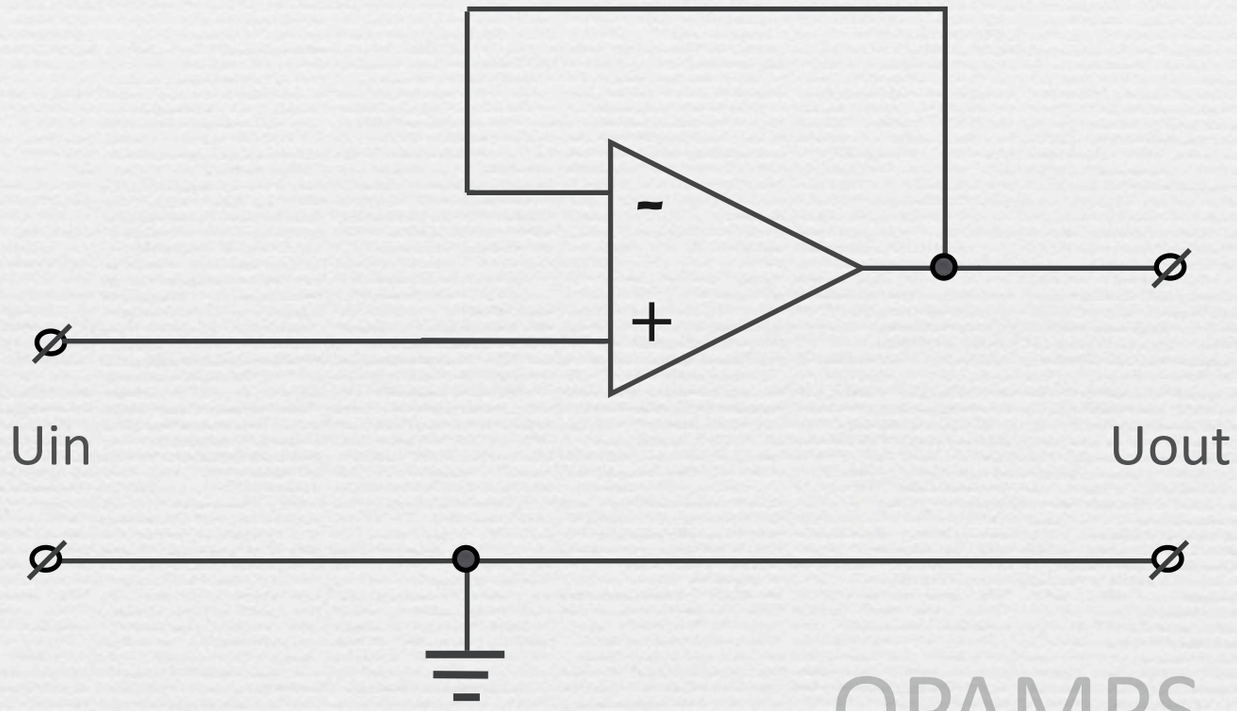
Some practical circuits, used in sensor world ...

Signal Buffer

Suppose you have to connect your sensor to more circuits, or sharing it with others, or driving it over long cables (installation). In that case it's wise to make use of buffers. Buffer circuits (in this case follower) act as buffer between the sensor output (week fragile signal) and the "outside world".

Au=Amplification=1 (= 0dB)

Uin = Uout



OPAMPS

Some practical circuits, used in sensor world ...

Inverting Amplifier

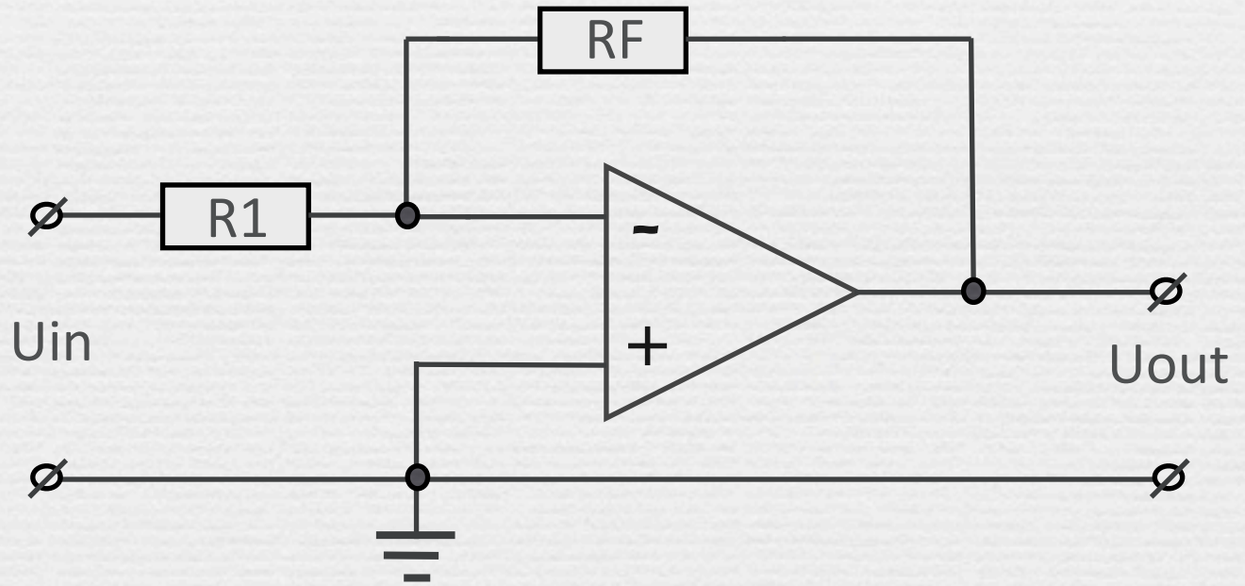
Most common amplifier circuit. The combination (ratio) of two resistors, determine the amount of amplification. Because we drive the negative input, the output values will be inverted!

Amplification = Au

$$Au = \frac{Uout}{Uin} = -\frac{RF}{R1}$$

$$Uout = Au * Uin$$

$$Uout = -\frac{RF}{R1} Uin$$



OPAMPS

Some practical circuits, used in sensor world ...

Non-inverting Amplifier

When driving the positive input, we talk about a non-inverting amplifier. The amplification of a non inverting amplifier is always more than 1.

Amplification = Au

$$Au = \frac{Uout}{Uin}$$

$$Uout = (1 + \frac{RF}{R1}) * Uin$$