SIGNAL CONDITIONING CIRCUITS: DIFFERENTIAL AMPLIFIERS

Electronic measurement systems are combinations of instruments and components interconnected to perform an overall measurement function. The system components must not only perform their individual functions properly 6ut must also work effectively with the other components making up the system. This requirement points out the importance of ensuring that proper interfacing exists between all components making up the system. Generally in a measurement system, the input variable is in the analog form that has to be converted to digital form for the purpose processing, transmission, display and storage. All these functions performed by the data acquisition system as well as the different types of power and loss measurements.

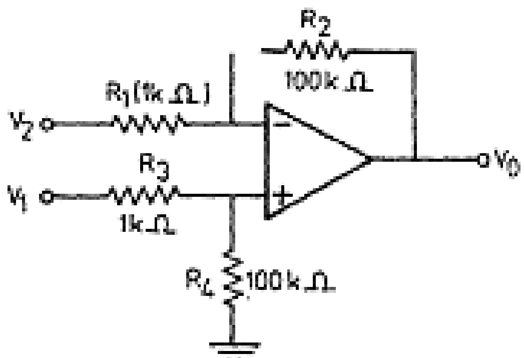
Differential amplifiers

The output voltage (Vo) from the above circuit is given by,

$$Vo = -\frac{R2}{R1}V2 + \frac{1}{1+\frac{R3}{R4}}V1\left(1+\frac{R2}{R1}\right)$$

$$\Rightarrow Vo = -\frac{R2}{R1}\left[V2 - \frac{1}{1+\frac{R3}{R4}}\left(\frac{R1}{R2}+1\right)V1\right]$$

s



For R1/R2=R3/R4, we obtain

$$Vo = -\frac{R2}{R1}\left(V2 - \frac{R1V1}{R1+R2} - \frac{R2V1}{R1+R2}\right)$$

$$\Rightarrow Vo = \frac{R2(V1-V2)}{R1}$$

- In the above circuit the input voltage V_1 has an input impedance of R_3+R_4
- The input impedance seen by the input voltage V_2 is R_1
- This low impedance may load the signal source heavily, but this can be avoided by using a high resistance buffer proceeding each input which is shown in the below circuit.

Source: http://mediatoget.blogspot.in/2012/02/signal-conditioning-circuits.html