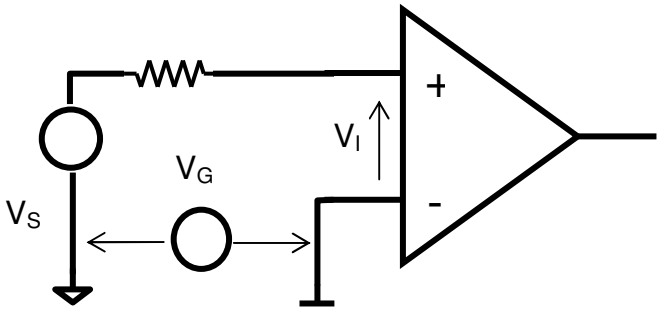
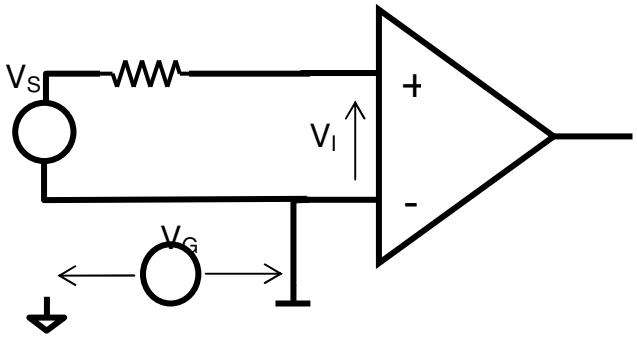
AMPLIFICADORES



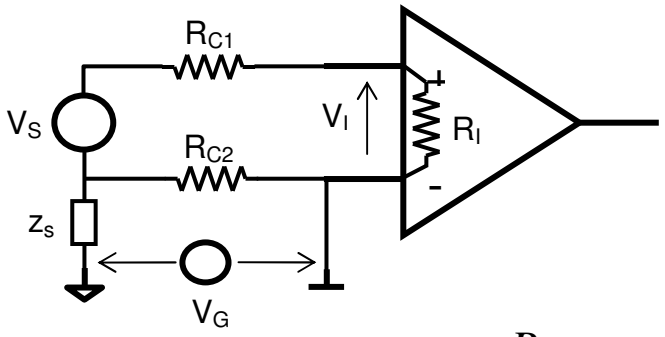
$$V_I = V_S + V_G$$

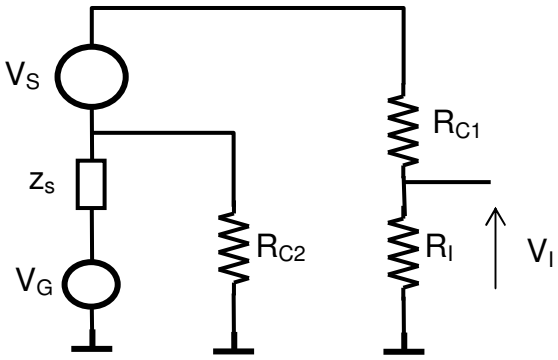
$$\left(S/N\right)_I = \frac{V_{IS}}{V_{IG}} = \frac{V_S}{V_G}$$



$$V_{IS} = V_S$$

$$V_G = 0$$

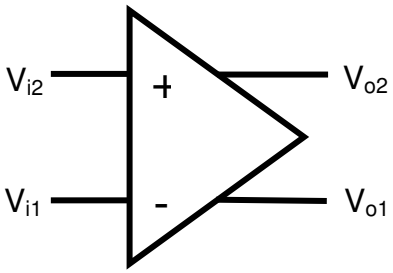


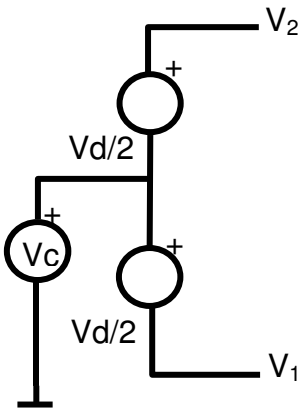


$$V_{IS} = V_S \cdot \frac{R_I}{\left(Z_S \;//\; R_{C2}\right) + R_{C1} + R_I}$$

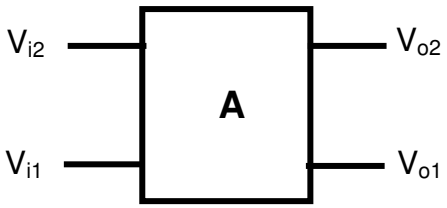
$$V_{IG} = V_G' \cdot \frac{R_I}{\left(Z_S \;//\; R_{C2}\right) + R_{C1} + R_I}$$

$$V_G' = V_G \cdot \frac{R_{C2}}{R_{C2} + Z_S}$$





$$V_d = V_2 - V_1 \quad ; \quad V_c = \frac{V_2 + V_1}{2}$$



$$V_{od} = A_{DD} \cdot V_{id} + A_{DC} \cdot V_{ic}$$
$$V_{oc} = A_{CD} \cdot V_{id} + A_{CC} \cdot V_{ic}$$

$$CMRR = \frac{A_{DD}}{A_{DC}}$$

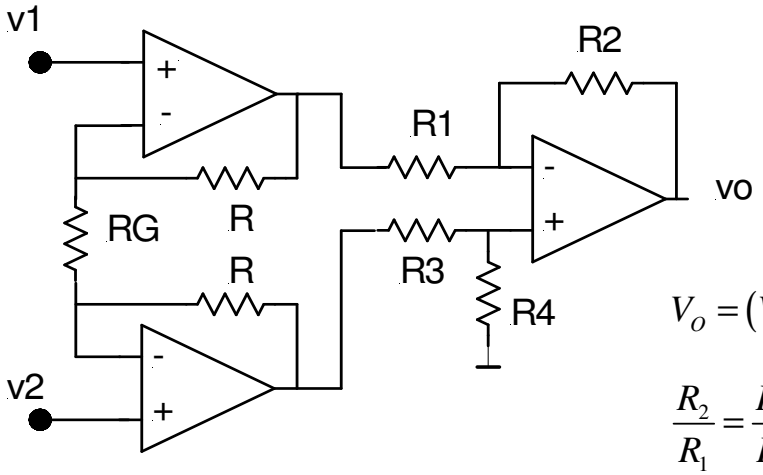
$$E = \frac{A_{CD}}{A_{DD}}$$

$$V_{od} = A_{DD}\left(V_{id} + \frac{V_{ic}}{CMRR}\right)$$

EN UN AMPLIFICADOR “SINGLE ENDED” (V_{o1}= 0) SOLO ESTÁN DEFINIDAS A_{DD} Y A_{DC}.

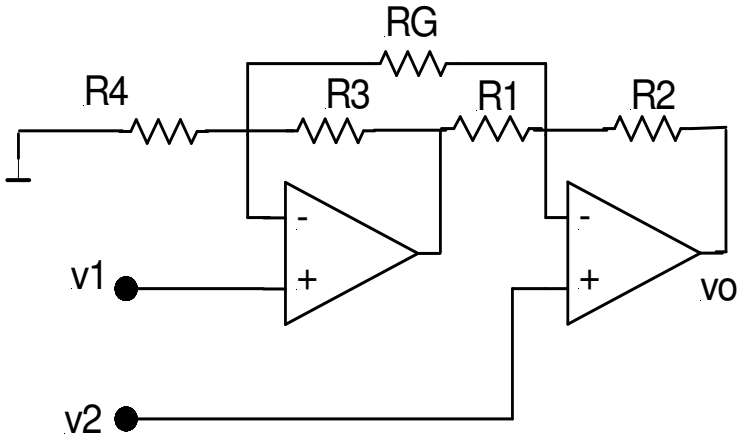
$$V_0 = A_D \cdot V_{id} + A_C \cdot V_{ic}$$

AMPLIFICADORES DE INSTRUMENTACIÓN



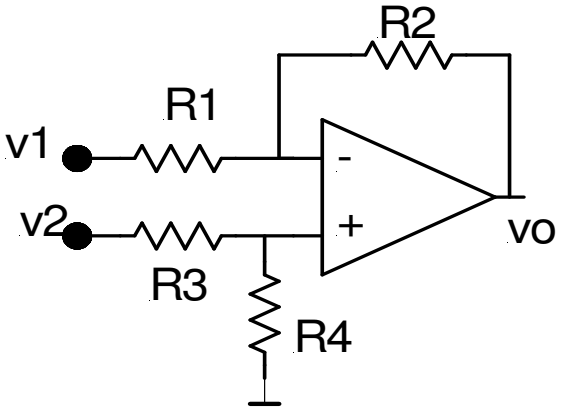
$$V_O = (V_2 - V_1)\left(\frac{R_2}{R_1}\right)\left(\frac{2R}{R_G} + 1\right)$$

$$\frac{R_2}{R_1} = \frac{R_4}{R_3}$$



$$V_O = (V_2 - V_1)\left(1 + \frac{R_2}{R_1} + 2\frac{R_2}{R_G}\right)$$

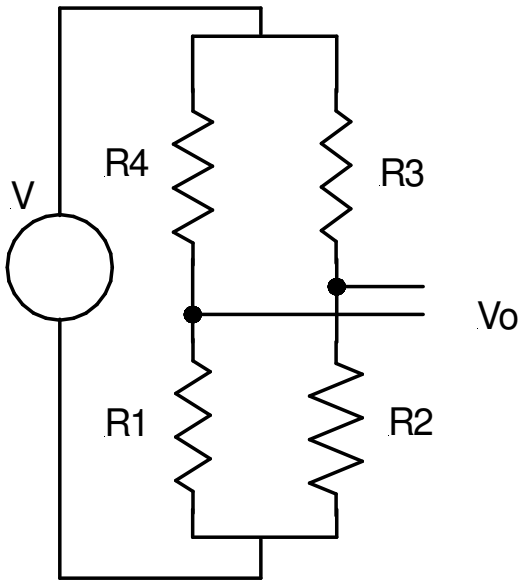
$$R_1 = R_3 \;\; ; \;\; R_2 = R_4$$



$$V_O = (V_2 - V_1) \cdot \frac{R_2}{R_1}$$

$$\frac{R_2}{R_1} = \frac{R_4}{R_3} \;\; (0{,}1\% \;\Rightarrow \text{CMRR} \leq 66 \text{ db})$$

EJEMPLO: PUENTES DE MEDIDA



$$V_o = \left(\frac{R2}{R2+R3} - \frac{R1}{R1+R4} \right) V =$$

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

Si $\frac{R4}{R1} = \frac{R3}{R2}$ $\boxed{V_o = 0}$

Si R1= R2= R4= R (un solo elemento variable)
y R3=R(1+ δ)

$$\boxed{V_o = \frac{\delta V}{2(2+\delta)}}$$

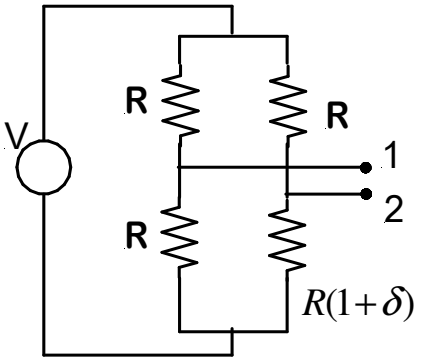
Si R2= R4= R
y R1= R3= R(1+δ) (mayor sensibilidad)

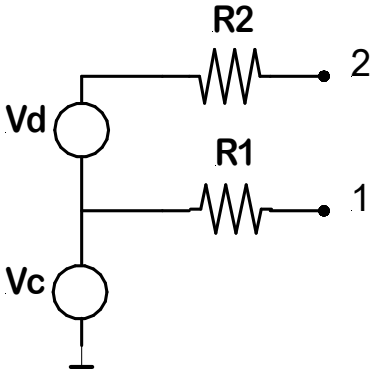
$$\boxed{V_o = \frac{1-(1+\delta)^2}{(2+\delta)^2} V \cong \frac{2\delta}{\delta+1} V}$$

Si R1= R4= R
y R2= R(1+δ)
R3= R(1-δ)

$$\boxed{V_o = \frac{\delta}{2} V}$$

CIRCUITO EQUIVALENTE.



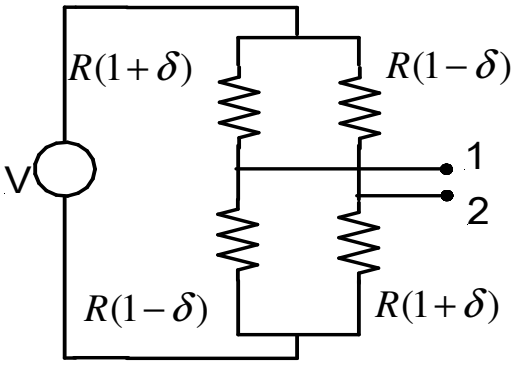


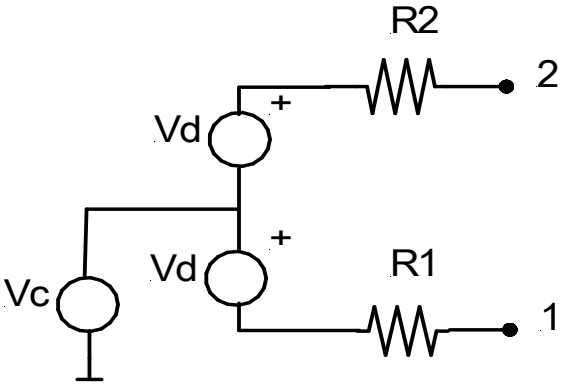
$$Vd = \frac{V}{2}\frac{\delta}{(2+\delta)}$$

$$Vc = \frac{V}{2}$$

$$R1 = \frac{R}{2}$$

$$R2 = R\frac{1+\delta}{1-\delta}$$





$$Vd = \frac{V}{2}\delta$$

$$Vc = \frac{V}{2}$$

$$R1 = R2 = \frac{(1-\delta^2)}{2}$$

GUARDAS