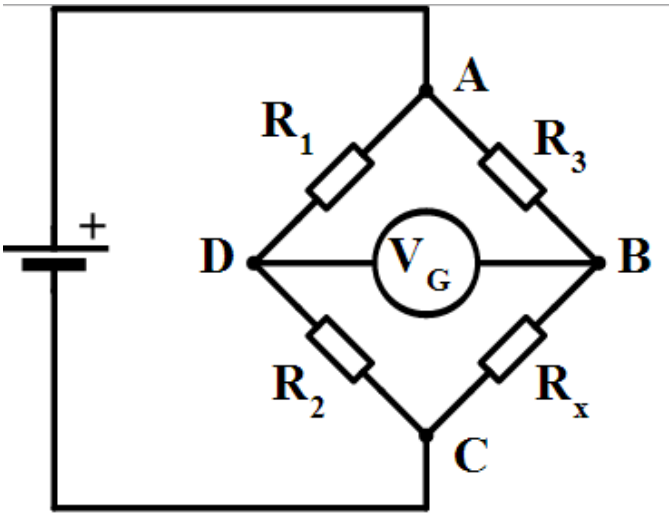
Task:

A Wheatstone bridge is used to measure an unknown resistance. If the Ratio setting is 10 to 1 and the reading on the dials is 345 V, what is the value of the unknown resistance?

Solution:



$$V_G = \left(\frac{R_x}{R_3 + R_x} - \frac{R_2}{R_1 + R_2}\right) V_s$$

If the bridge is not balanced the ratio $\frac{R_2}{R_1}$ will not be the same to $\frac{R_x}{R_3}$.

So if by "reading on the dials" you mean AC and the bridge is balanced then it doesn't matter how high the supply voltage is, the formula will remain $R_x = \frac{R_3 R_2}{R_1}$

If by "reading on the dials" you mean BD then the bridge is not balanced and as you can see in the formula

$$V_G = \left(\frac{R_x}{R_3 + R_x} - \frac{R_2}{R_1 + R_2}\right) V_s$$

you will have 2 variables R_x and V_s and the solution will be undefined

Answer:

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