Answer on Question#55887 - Physics - Electromagnetism

A galvanometer with coil resistance $r = 12.0\Omega$ shows full scale deflection for a current of $I_g = 2.5mA$. How would you convert it into a voltmeter of range $V_{min} = 0$ to $V_{max} = 10.0V$?

3988Ω in series
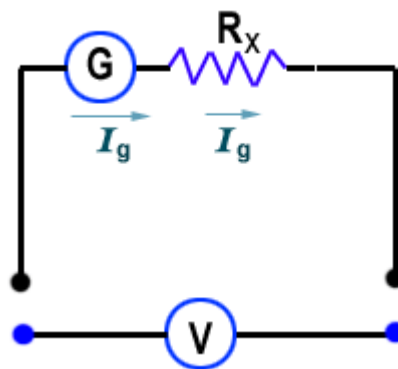
0.43Ω in parallel

2000Ω in parallel

1.62Ω in series

Solution:

To convert galvanometer into a voltmeter we should add some resistance R_x in series. To find this resistance we must take into account that the sum of voltage drops in r and R_x for I_g equals V_{max}:

$$I_g(r + R_x) = V_{max}$$

Therefore

$$R_x = \frac{V_{max}}{I_g} - r = \frac{10V}{2.5mA} - 12\Omega = 3988\Omega$$

Answer: 3988Ω in series.