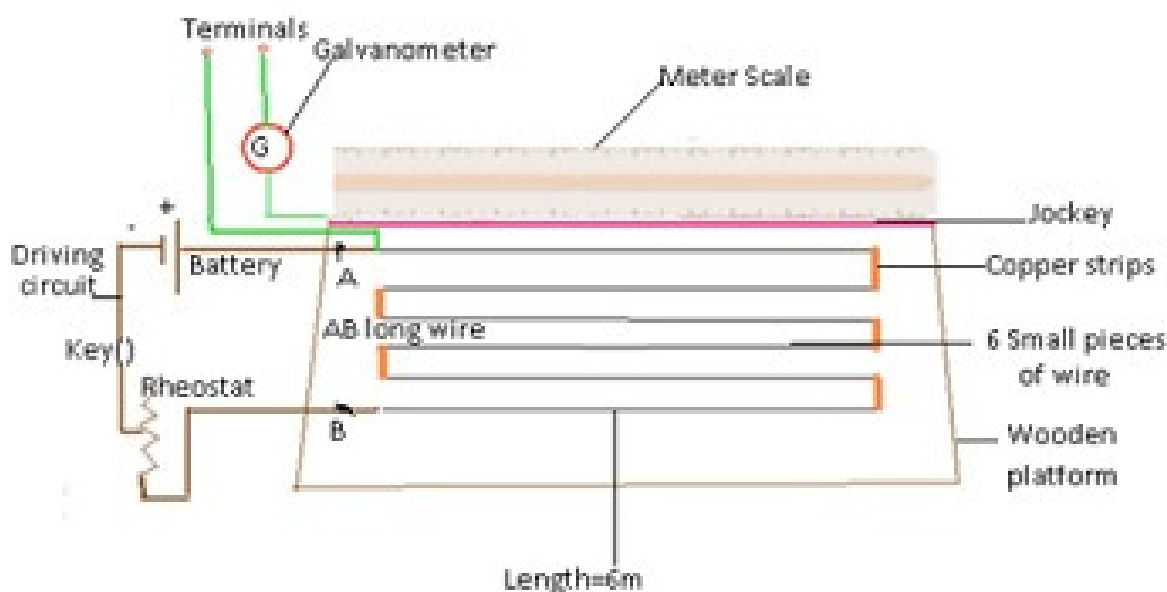


Potentiometer

- Potentiometer consists of long wire with uniform cross-section.
- Instead of long wire small pieces of wire is taken and each of those pieces are fixed parallel to each other on a platform.
- Wires are connected by a copper strip. As there are 6 pieces of wire therefore the length of the wire =6m.
- There is a driving circuit which consists of battery, key and rheostat.
- This is the circuit which will provide the current, and this current flow through this longwire.
- One end of galvanometer is connected to the point AB on the circuit with the help of jockey, and other end is left free.

Terminals of potentiometer(End points)

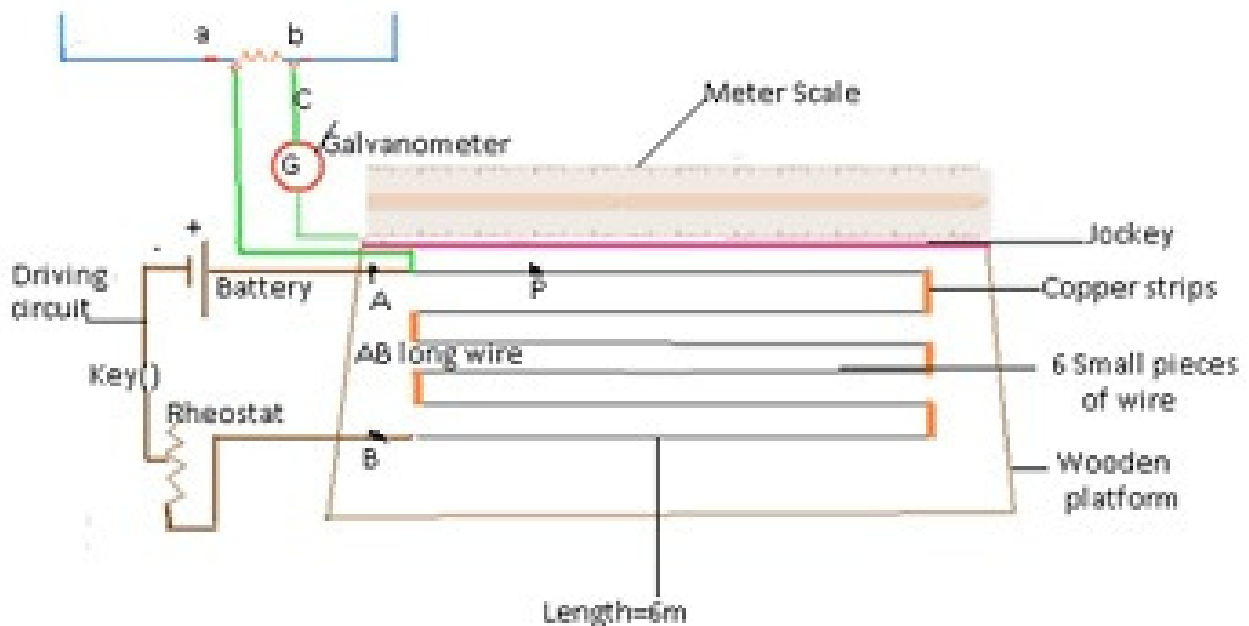
- These are the points between which the potential difference needs to be measured.
- One endpoint = free end of the galvanometer and other endpoint = the one end of wire A of the circuit.
- End A is at higher potential and end B is at lower potential.



Working:-

- To find out potential difference between 2 points (a and b) of the circuit.
- Point A is connected to (a) and point C is connected to (b).
- Assume all the connecting wires have 0 resistances.
- Potential at point 'a' = Potential at point 'A'.
- Similarly potential at 'b' = Potential at some point before B.
- While Sliding the jockey there will be a point where galvanometer shows deflection equal to 0. Let that point be P.

- Therefore, potential at point 'b' = potential at point 'P'.
- Let $AB = L$ (length) and $AP = l$. At $L =$ value of deflection is 0.
- Potential due to driving circuit = $V_0 =$ potential between A and B.
- Potential gradient (ρ) = (potential between A and B) / (length of AB) = (V_0/L)
- Potential between A and P (V_0) = Potential between 'a' and 'b' (V).
- $= (\rho \times l) = (V_0/L) \times l$ Equation (i)
- To determine V_0 :-
- Replace 'a' and 'b' with a cell of known Emf (E) = $V_0(I_0)/L \Rightarrow V_0 = (EL)/(I_0)$
- Where $I_0 =$ deflection in galvanometer is 0.
- Using (i) $\Rightarrow V = V_0(l/L) = (EL)/(I_0)$
- Therefore $V = (El)/(I_0)$



Conclusion:-

- The potentiometer has the advantage that it draws no current from the voltage source being measured.
- As such it is unaffected by the internal resistance of the source.