

THE BATTERY

1. The battery is the source of electrical energy.

2. It provides a constant potential difference across the circuit.

3. The potential difference across the battery is called the electromotive force (e.m.f.).

4. The e.m.f. of a battery is the work done by the battery in moving a unit charge round the circuit.

5. The e.m.f. of a battery is denoted by \mathcal{E} .

6. The e.m.f. of a battery is the sum of the potential differences across all the components in the circuit.

7. The e.m.f. of a battery is the sum of the potential differences across the internal resistance and the external resistance.

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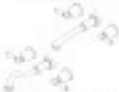
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CONNECTION



Component	Current	Potential Difference	Power
Battery	I	$\mathcal{E} - Ir$	$I(\mathcal{E} - Ir)$
External Resistance	I	IR	I^2R
Internal Resistance	I	Ir	I^2r

The total power supplied by the battery is $I\mathcal{E}$. This is equal to the sum of the power dissipated in the external resistance and the internal resistance, i.e. $I\mathcal{E} = I^2R + I^2r$.

The maximum power is transferred to the external resistance when $R = r$.