

Practical Electricity - Lesson 3

Earthing

The live wire in an appliance may come into electrical contact with its metal casing. It could be caused by loose wiring, a loosened metal part that comes into contact with both the metal casing and live wire or other causes.

Without earthing

In Figure 1, an electrical fault results in the live wire in an appliance touching its metal casing. This causes the metal casing to become *live*. If a person were to touch the metal casing, the person will get an electric shock. The fuse will not prevent an electric shock as only a small current will flow through the person. The combination of high voltage and a small current is sufficient to cause an electric shock.

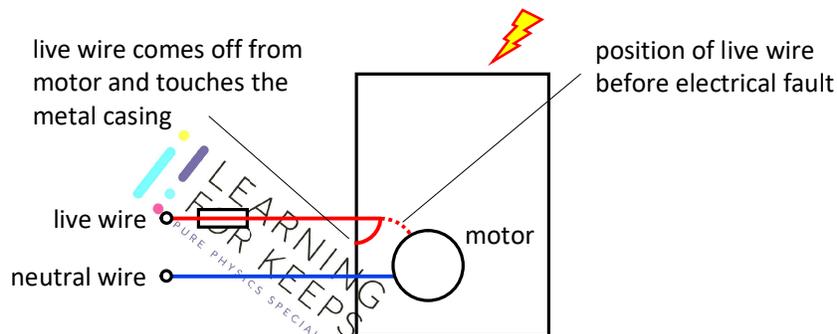


Figure 1 – A person who touches the metal casing will get an electric shock

With earthing

Normally, the earth wire is connected to the metal casing of an appliance (Figure 2). If an electrical fault results in the live wire touching its metal casing, the earth wire provides a path for electric current from the live wire to pass through. As the earth wire has a low resistance, a large current will flow through the live wire. This causes the fuse to blow, opening the circuit. Thus, the appliance is no longer live and poses no electrical danger.

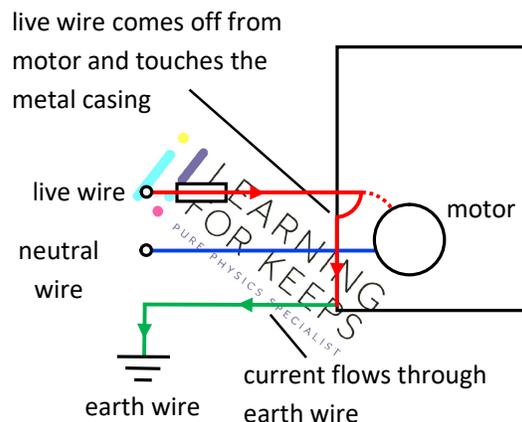


Figure 2 – A person who touches the metal casing will not get an electric shock

Quiz

a) Referring to the scenario in Figure 2, state and explain whether the fuse will still blow if it were instead connected to

(i) the neutral wire,

(ii) the earth wire.

b) Still referring to the scenario in Figure 2, state and explain whether connecting the fuse to the earth wire instead of the live wire will similarly prevent an electric shock.

Double insulation

A **double insulated** appliance is one which has been designed in such a way that they do not need to be connected to the earth wire. These appliances carry the double insulation symbol (Figure 3). They use a two-pin plug, as only the live and neutral wires are required.



Figure 3 – Double insulated appliances carry the above symbol

Double insulation provides two levels of insulation. This is usually achieved by having two layers of insulating material surrounding live parts.

Appliances with this feature normally have non-metallic casings. Mobile phone charger, hairdryers and electric drills are normally double insulated.

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