



## RHUMKORFF'S COIL - spark coil

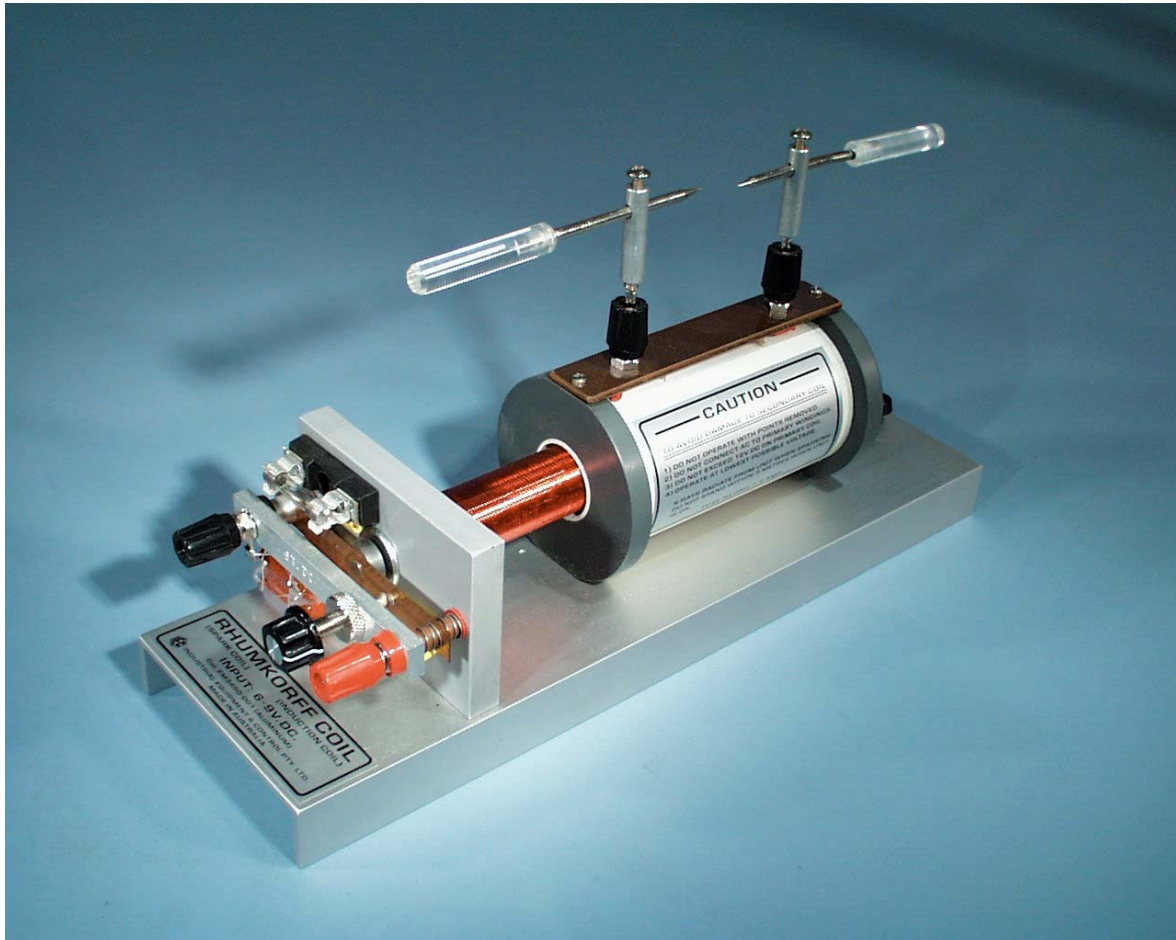
Cat: EM3450-001 6V – 9V.DC. operation

**DESCRIPTION:** including principle of operation.

**INPUT:** 6 to 9V.DC. at about 5 to 7 amps. Fitted with 7.5 amp fuse. (type 3AG)

**OUTPUT:** typically 25 to 30mm spark discharge between needle points.

### EM3450-001 Rhumkorff's Coil



Physical size: 300x125x110mm LxWxH

Weight: 1.77 kg

**CAUTION:** Be careful touching this instrument when it is running because very high voltages are generated.

Spark gaps can produce X ray and UV radiation. Although risk is very low, do not come closer than necessary to the spark discharge and avoid being closer than about 2 metres for prolonged periods.

**OPERATION NOTES:**

The Rhumkorff Coil is a 'trembler' type spark coil. A primary coil of few turns of heavy wire is wound on an iron core and is fed by pulses of DC current. This coil is mounted horizontally so that another larger diameter coil can be slid over the outside of it. The iron core attracts an armature which breaks a contact that feeds the current into the primary coil. When the current is interrupted and the magnetic field collapses, the armature returns to make electrical contact again and current flows in the primary coil again. Thus the armature oscillates or vibrates and the current through the primary coil is switched on and off very quickly as the contacts on the armature rapidly open and close.

A secondary coil of many turns of fine wire is slid over the outside of the primary coil so that the pair of coils are magnetically coupled and behave as a transformer. As the secondary coil is slid lengthways off the primary, the magnetic coupling is reduced and the output energy in the secondary coil is reduced.

The voltage developed in the secondary coil of a transformer depends on:

- The turns ratio between primary and secondary coils
- The strength of the magnetic field
- The rate of change of the magnetic field passing through the coil windings.

In a normal transformer, the magnetic field is rising and falling on a sine wave pattern which is predictable. In the case of the Rhumkorff Coil, the magnetic field is being switched on and off very suddenly so that the magnetic field collapses almost instantly and this means that the rate of change of magnetic field is extremely high. Because of this high rate, the highly insulated secondary coil develops a very high voltage of around 50,000 volts.

The contact points that open and close rapidly to energise the primary coil will show signs of arcing. This arcing is current flowing through the air between the points, therefore, to make the turning on and off of the current into the primary coil very fast, it is best not to have arcing at the points.

To reduce arcing, a capacitor is connected across the points and it absorbs some of the energy of the arcing, reduces it and makes the on/off switching transition faster, cooler and more efficient.

Special adjustable needle point contacts with insulated finger grips permit high voltage repetitive sparks up to 25mm long to be produced. Under the needle point socket terminals, a safety spark gap is provided to protect the coil against very high voltages that might cause internal damage to the secondary coil.

**CAUTION:**

- This unit should not be run by students unless closely supervised.
- Small amounts of radiated emissions occur from the sparking. Do not stand too close to the sparking for prolonged periods.

**Designed and manufactured in Australia**