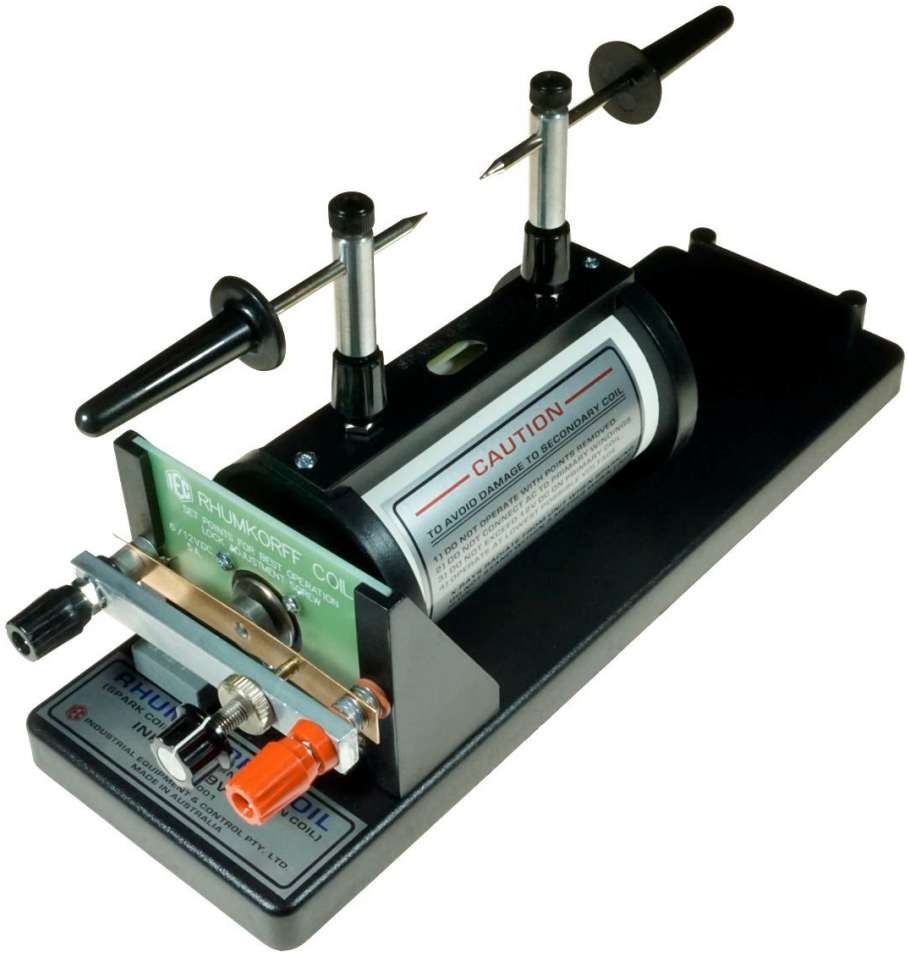
Ruhmkorff's Coil

Spark Coil



EM3450-001 6V – 9V.DC. operation

Description:

INPUT: 6 to 9V.DC. at about 5 amps. Fitted with 7.5 amp fuse. (type 20x5mm)

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

CAUTION: Be careful touching this instrument when it is running because very high voltages are generated at the adjustable needle point spark gap.

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.

Length: 45mm	Width: 56mm	Height: 110mm	Weight: 400g

Operation Notes:

The Ruhmkorff Coil is a 'trembler' type spark coil. This means that an adjustment is provided to cause 2 special contact points just touch lightly which permits current to flow in a coil. When current flows, a magnetic field in the iron core pulls the points apart again which removes the field which causes the points touch again … etc. The result is that the points vibrate open and closed to give rapid pulses of current through the primary coil. The adjustment of the points is important so that the vibration is steady.

The primary coil has few turns of heavy wire wound on an iron core and the coil is fed by pulses of DC current from the vibrating contact points. This coil is mounted horizontally so that another larger coil (secondary coil) can be slid over the outside of it. The iron core, which magnetically attracts a small iron armature to cause the points to vibrate open and closed, contains a magnetic field that rises and collapses very quickly.

The secondary coil has thousands of turns of fine wire and when one coil is over the other, the 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 as a controlledsine wave. In the case of the Ruhmkorff 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 as the field collapses.

The contact points that open and close rapidly to energise the primary coil will show signs of arcing (or sparking). This arcing is caused by current flowing through the ionized air between the points, therefore, to make the current on/off switching to the primary coil as fast as we can, it is better not to have arcing at the points.

To reduce arcing, a good quality high voltage capacitor is connected across the points and it absorbs some of the energy of the arcing thereby reducing it and it 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 about 25mm long to be produced. Under the needle point socket terminals, a safety spark gap is provided to protect the secondary coil against very high voltages that might cause internal electrical breakdown of the secondary coil.

Caution:

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

Designed and manufactured in Australia