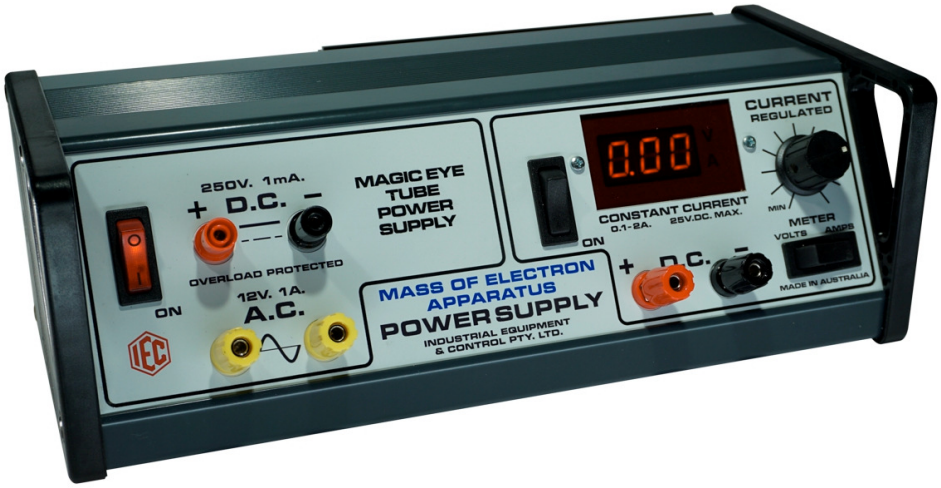
Power Supply

Mass of Electron



LB2622-002 Mass of Electron Power Supply with Digital Meter

Description:

This power supply is designed for use with a particular experiment called “Mass of an Electron”. It provides 250V.DC. voltage at 1 milliamp for running the anode of the ‘Magic Eye” tube, 12V.AC. at 1 amp for running the heater of the tube.

The unit provides also a Regulated Current output up to 2 amps for running an Air Cored Solenoid for providing the magnetic field that deflects the electron beam in the tube.

The power supply has 4mm safety sockets for the high voltage and standard sockets for the low voltage connections.

The analogue meter can be switched to monitor the constant current or the voltage supplied.

A convenient power cable from the “Magic Eye” tube holder (not supplied) connects directly to the power supply terminals for anode voltage (250V.DC) and heater voltage (12V.AC).

Other Uses:

Although this power supply is designed specifically for the “Mass of an Electron” experiment, it is a useful general purpose power supply where a preset constant current is required through a load, up to a maximum of 2 amps and 25V.DC.

Some experiments in electronics require such a supply for producing special waveforms and for performing certain experiments on capacitors and charging.

Length: 322mm	Width: 155mm	Height: 110mm	Weight: 4.6kg

Current Regulation - Explanation:

Some electrical loads require a preset current passing through them which must remain exactly constant. For example, if a very steady magnetic field is required from a solenoid coil, and since the magnetic field is dependent on the number of turns and the current flowing, the current through the coil must be exactly constant even if the temperature and resistance of the coil changes. This means that the voltage applied to the coil must change automatically as required to ensure that the current flowing through the coil is constant.

If the terminals of a Constant Current power supply are short circuited together, the current that flows is the same current as when the load is applied. If the terminals are open circuit, current can no longer flow.

The output voltage rises to its highest level attempting to force the current through the open circuit but this cannot occur so the Power Supply cannot regulate.

In a similar way, if the resistance of the load rises too high and if there is insufficient voltage available to push the pre-set current through the load, the power supply cannot regulate.

A power supply designed to automatically alter its voltage to keep a constant current flowing through the load is called a Constant Current Power Supply. This instrument provides this output up to a maximum of 25V.DC. and the preset current is adjustable from 0.1 amps to 2 amps. It follows that at 2 amps load, the highest resistance load that can be used on this power supply, when set to 2 amps, is 12.5 Ohms.

Specifications:

INPUT: 220/240V.AC. 50/60Hz**.**

OUTPUT:

Power supply has two sections for “Magic Eye” and “Air Cored Solenoid”.

Left side of front panel provides the following:

- **AC. output:** 12V.AC. at 1 amp output current. This is used to power up the heater of the “Magic Eye” tube so that electrons can be created at the cathode.
- **DC output:** 250V.DC at 1mA output current. This is isolated from mains voltage and used to power up the “Magic Eye” tube anode / cathode circuit.
- **Protection:** Both AC and DC outputs are protected against overload or short circuit.

These outputs are for operating the “Magic Eye” tube, AP2120-001, which consists of a tube mounted to a base and provided with cables and plugs for connections, which can be seen in the image on page #1.

A spare “Magic Eye” tube only is part number PA2120-002.

Right side of front panel: For operating the IEC “Air Cored Solenoid” (EM0090-001)

To perform the experiment, an Air Cored Solenoid is placed over the Magic Eye Tube so that the electron beam on the upper end of the tube is close to half way up the length of the solenoid. As the current through the coil and therefore the magnetic field strength is altered, the pattern is observed and measured.

By measuring the radius of curvature of the path of the electron beam and calculating the strength of the magnetic field mid way along the solenoid permits the mass of an electron to be approximated.

This Solenoid Coil output is complete with its own on/off rocker switch and control knob to provide a fully adjustable and electronically **current regulated DC output** so that the Air Cored Solenoid can produce a very constant magnetic field around the Magic Eye tube. This permits an experiment to be performed providing reliable results.

The analogue meter can be switched to monitor either output Amps or Volts.

Designed and manufactured in Australia