

Electricity and magnetism

A two-part ammeter

Make a simple functional ammeter

You will need....

- ✓ Magnetic plotting compass
- ✓ Enamelled copper wire
- ✓ Plastic or paper former
- ✓ Two pins
- ✓ Card or wood base (ca. 80 × 80 mm)
- ✓ (Variable power supply and multimeter for calibration)

Background:

The current in the coil produces a magnetic field which can deflect a compass.

Follow these steps:

1. Make a solenoid by winding about 50 turns of thin enamelled copper

wire around a plastic or paper former. Remove the enamel from the ends of the wire and solder them to two pins.

2. Glue the solenoid, pins and compass to the base with hot glue; arrange as shown in the picture.
3. Calibration: Orient the assembly so that the compass needle is parallel to the axis of the coil; mark this as zero. Attach a power supply so that a current deflects the compass needle clockwise. Increase the current in the coil in steps of 40 mA (or other suitable value). Mark the position of the compass needle at each step.

So what happened?

The solenoid acts as a magnet when there is an electric current in the wire. The magnetic field of the solenoid deflects the compass needle. This 'meter' works quite well; its disadvantage is that it must be aligned in a South-North direction.

What next?

1. Make meters for different current ranges. Use heavier wire and fewer turns for larger currents.

