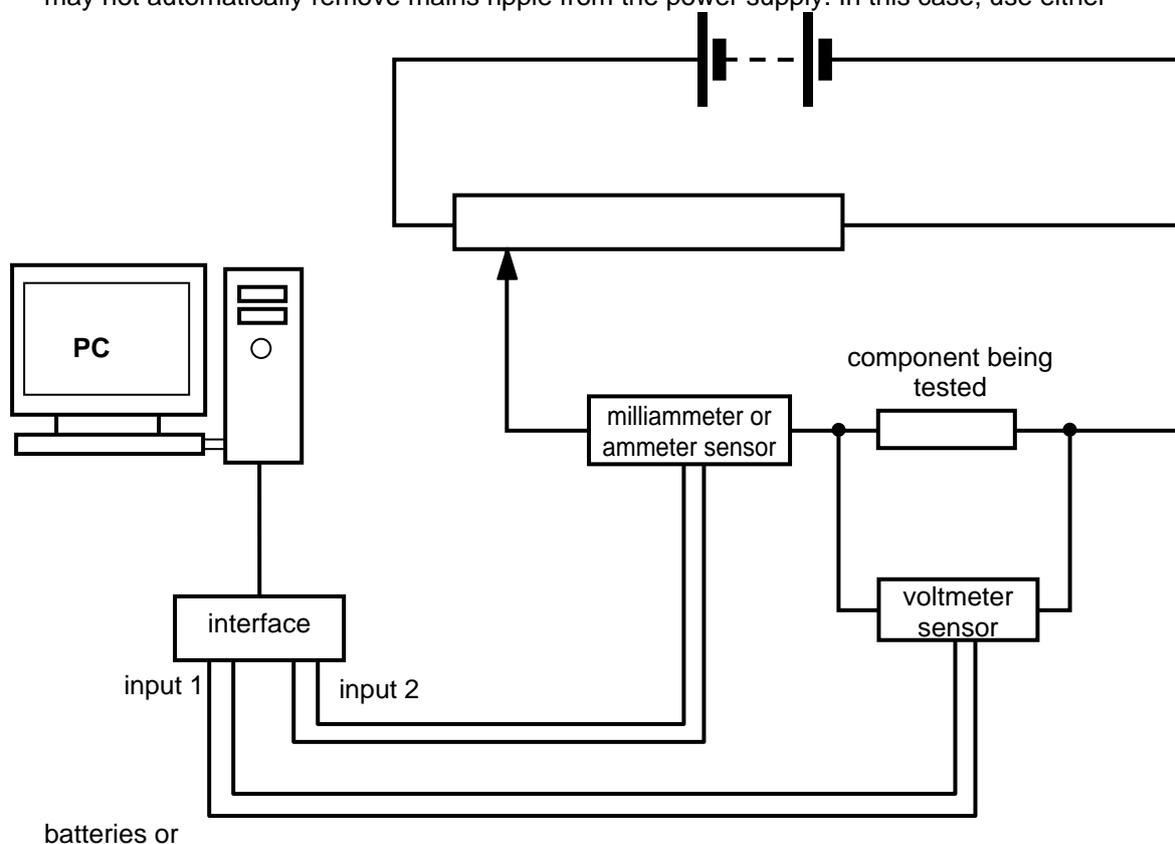


TAP 109- 2: Electrical characteristics - datalogging alternative

The details of the set-up will depend on the types of sensors that your school uses. Sensors may not automatically remove mains ripple from the power supply. In this case, use either



a smooth stabilised power supply designed for electronics work.

The basic arrangement is shown above. Results can be taken simply by sliding the contact along the rheostat - with a suitable software package this will draw a graph of I against V in real time. Reversing the component has the effect of changing the sign of both I and V , providing data for 'reverse bias' conditions. If this method is used with the filament lamp, care must be taken to get reliable results. The high sampling rates of most dataloggers means that the current and voltage can be recorded before the filament itself reaches an equilibrium temperature. To get the expected curve for the filament lamp it is important that the rheostat is adjusted slowly. Alternatively it should be possible to take discrete readings rather than sampling continuously. This allows the current to be adjusted and temperature equilibrium to be reached before anything is measured.

An interesting extension experiment or demonstration is to monitor the current through the filament lamp as it is switched on. This shows an initial surge (while the filament is relatively cool and therefore has lower resistance) and a gradual reduction to a steady value (at constant high temperature). Be sure to check the inherent response time of the sensor however, or you could be measuring an artificial effect only!

This diagram illustrates the generic set-up for a data-logging experiment. Note that, for some systems, only voltage sensors are provided so you can convert them to current sensors by putting them in parallel with $1\ \Omega$ resistors.

