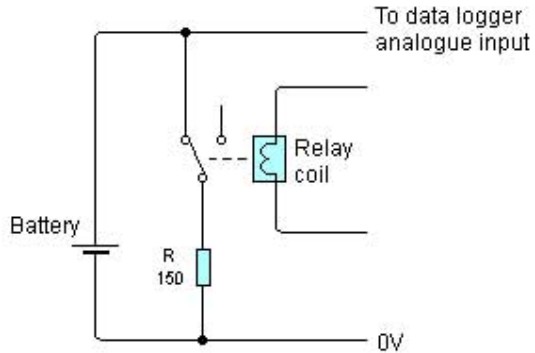


Battery data logging

The detailed data on the discharge of the coin cell was obtained by logging the voltage while the battery was discharging.

Measurements were made using a [Smart Box](#) interface.



The battery voltage was monitored by logging the voltage across it with the data logger every 20 seconds. A 150Ω resistor could be connected across the battery, or disconnected, by controlling the relay. The relay coil was controlled by the Smart Box.

The resistor was disconnected for 20 seconds and the battery voltage was logged. Then the 150Ω resistor was connected for 20 seconds, and the voltage re-measured. This process was repeated until the battery was exhausted.

The battery voltage V_B is given by the equation:

$$V_B = V_I \left(\frac{R_L}{R_L + R_I} \right)$$

Where V_I is the ideal battery voltage (the voltage when it is not supplying any current), R_L is the load resistor (150Ω in this case) and R_I is the internal voltage of the battery.

From this we can show that:

$$R_I = R_L \left(\frac{V_I - V_B}{V_L} \right)$$

Since we have monitored V_I and V_B during the discharge process, and we know R_L , we can find R_I .

The data was fed into Excel to perform the calculations and draw the graphs.