

## **Current Monitoring:**

Current measurement is crucial for monitoring the electrical current flowing through the wire or electrode during the WAAM process. It helps ensure that the desired current levels are maintained for proper melting and deposition of the material. Electric current can be measured using many ways. Hall Effect Sensor was chosen for this purpose since this experiment involves high current, required electrical isolation and resolution.

**Methodology:** Initially, the wire from the MIG machine is passed through the Hall Effect Sensor. Its working phenomenon is that drifting charge carriers are deflected by a magnetic field, which in turn results in an output voltage signal which is proportional to the external magnetic field  $B$  in the direction of measured electric current  $I$ . The output small current is proportional to the large current running through the wire which is passing through the hall effect sensor.

The Hall Effect sensor produces Hall Voltage due to the magnetic field created by the current carrying wire. This Hall Voltage is then passed through the current sensing circuitry. As the current sensing circuitry produces less output voltage. Hence an operational amplifier is used in unity gain configuration.

The Hall effect sensor used in our case is LA305-S which is a closed loop current transducer with a measuring range of 500A and with an accuracy of 0.8%.

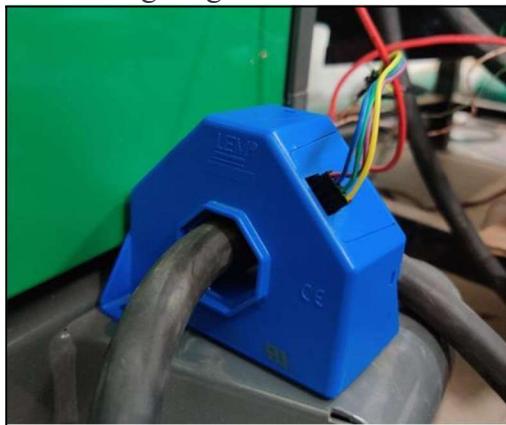


Fig . Hall Effect Sensor

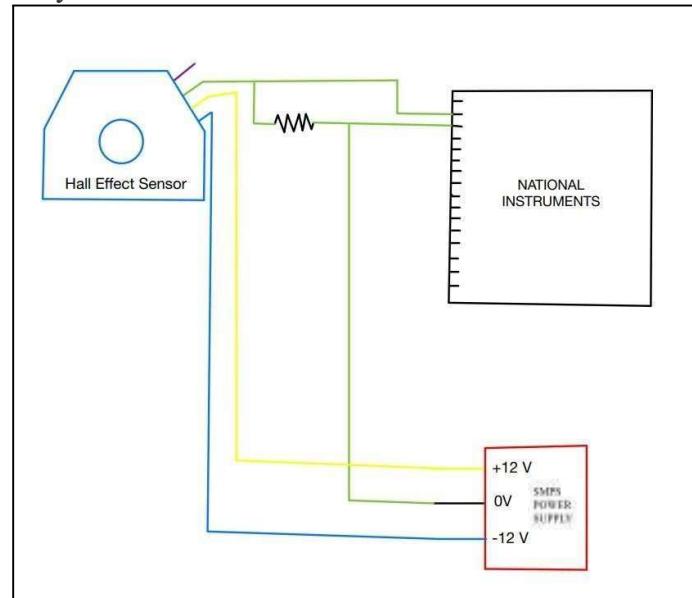


Fig . Current Monitoring Circuit