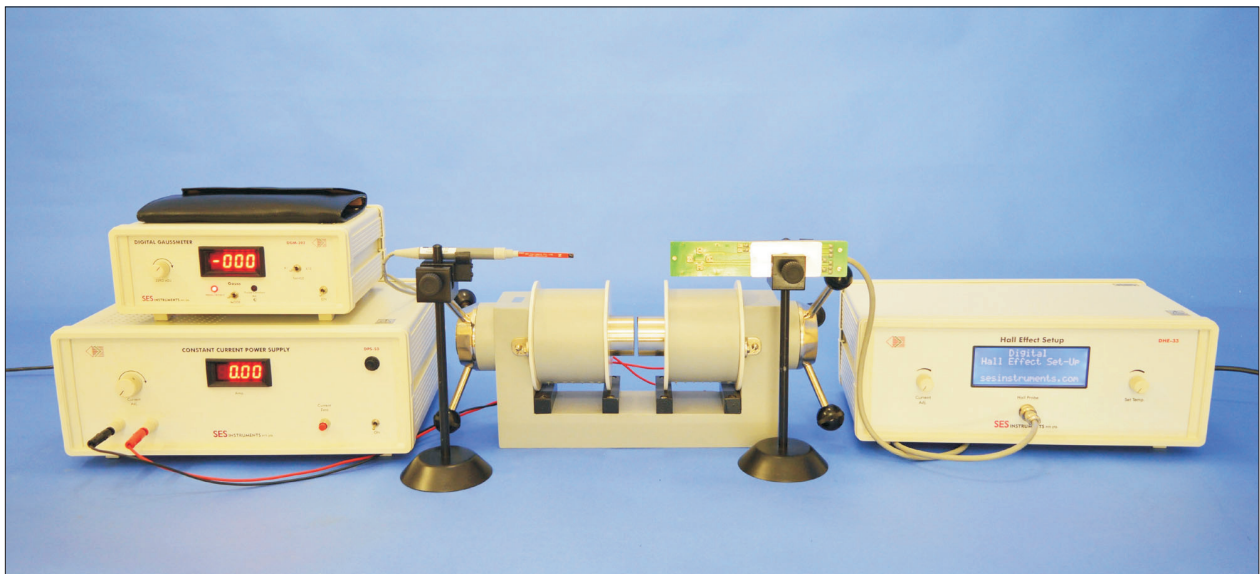


# Hall Effect Setup

HEX-33

SES Instruments Pvt Ltd.

## Dependence of Hall Coefficient on Temperature



### Description

The Hall voltage for p-carriers has opposite sign from that for n-carriers. Therefore if a semiconductor with p-type doping is gradually heated up, more and more electrons from its valence band will go to conduction band. As a result hall voltage would fall rapidly with temperature and even become zero or change sign. At the point of zero Hall Coefficient, it is possible to determine the ratio of mobilities  $b = m_e/m_h$ . The Hall coefficient inversion is a characteristic of only p-type semiconductors.

The set-up consists of the following. The Hall Probe comes complete with

#### 1. Hall Probe (Ge: p-type), HPP-33

Ge single crystal with four spring type pressure contacts is mounted on a glass-epoxy strip. Leads are provided for connections with the current source and Hall voltage measuring devices.

#### Oven

It is a small 12W oven mounted over the crystal for heating from ambient to 100 C.

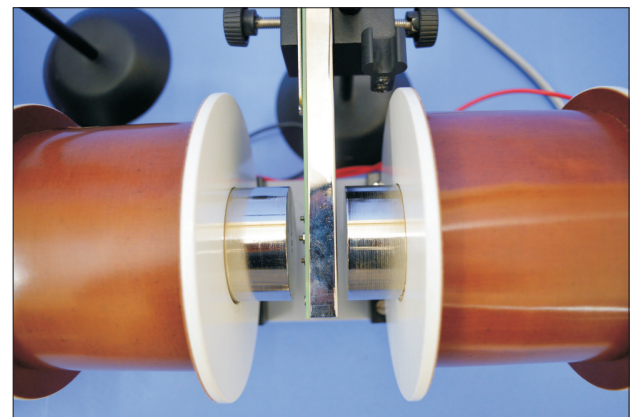
#### Temperature Sensor

Cromel-Alumel thermocouple with its junction at a distance of 1 mm from the crystal.

#### 2. Hall Effect Set-up :DHE-33

The set-up, DHE-33 consists of two sub units to handle the probe parameters (probe current and hall voltage) and measurement of temperature. While the probe current is generated and measured by

A constant current source (0-20mA) having a resolution of  $10\mu\text{A}$ , the hall voltage is measured by a high input resistance millivoltmeter in the range 0-200mV having a resolution of 100mV. The Probe. Current and hall voltage are both displayed on a 16 x 4 line LCD display. The sample temperature is controlled by a microcontroller based PWM heater current source. Thermo emf of the thermocouple is converted into temperature and is displayed on the same 16 x 4 line LCD display on the panel. Temperature range is ambient to 100 C and resolution is 1 C.



- 3. Electromagnet, EMU-50V  
(Refer datasheet for specifications)
- 4. Constant Current Power Supply, DPS-50/  
DPS-50-C1 (Refer datasheet for specifications)
- 5. Digital Gaussmeter, DGM-202/  
DGM-202-C1/ DGM-102 (Refer datasheet for specifications)

**Optional**

Computer connectivity along with required hardware and software are optional and can be ordered as required.

*The experiment is complete in all respect.*

