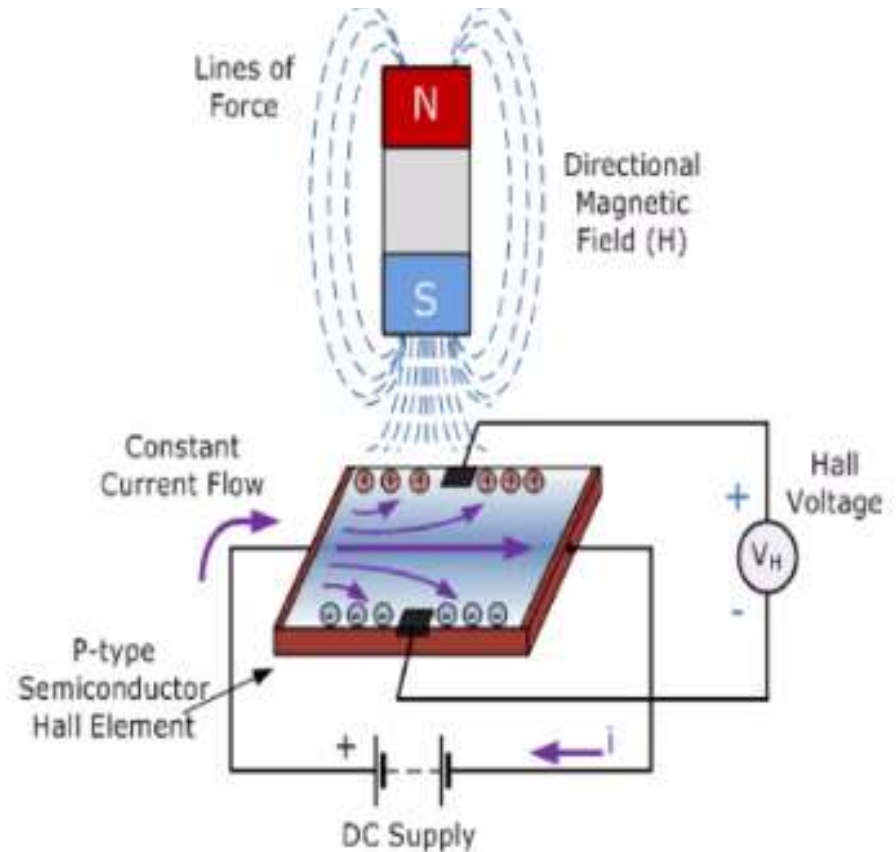


# Hall effect sensors

- A **Hall effect sensor** is a transducer that varies its output voltage in response to a magnetic field. **Hall effect sensors** are used for proximity switching, positioning, speed detection, and current **sensing** applications.



- ▶ Hall effect is the production of voltage difference (Hall voltage) Across a current carrying conductor In the presence of magnetic field Perpendicular to both Current and magnetic field

**Hall Effect Sensors** are available with either linear or digital outputs. The output signal for linear (analogue) sensors is taken directly from the output of the operational amplifier with the output voltage being directly proportional to the magnetic field passing through the Hall sensor. This output Hall voltage is given as:

Where:

$V_H$  is the Hall Voltage in volts

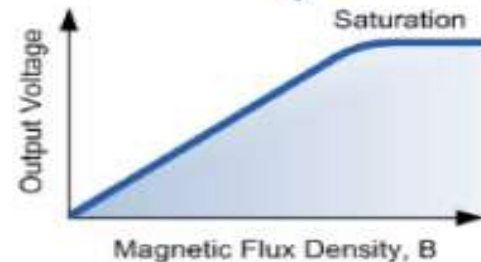
$R_H$  is the Hall Effect co-efficient

$I$  is the current flow through the sensor in amps

$t$  is the thickness of the sensor in mm

$B$  is the Magnetic Flux density in Teslas

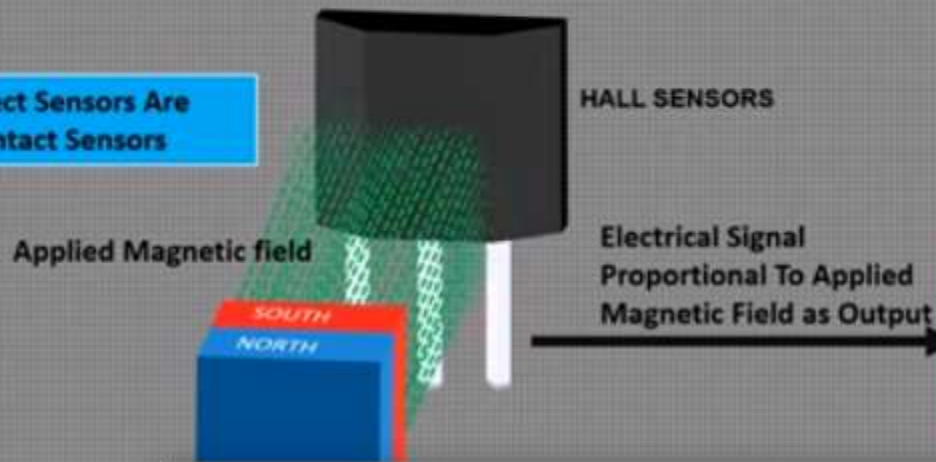
$$V_H = R_H \left( \frac{I}{t} \times B \right)$$



**Hall Effect Sensor or Hall Sensor is a Magnetic Sensors which Generate Electrical Signals Proportional to the Magnetic Field Applied On It.**

**Hall Effect sensors are widely used in Industrial Applications like Current-sensing, Position Detection and Contactless Switching.**

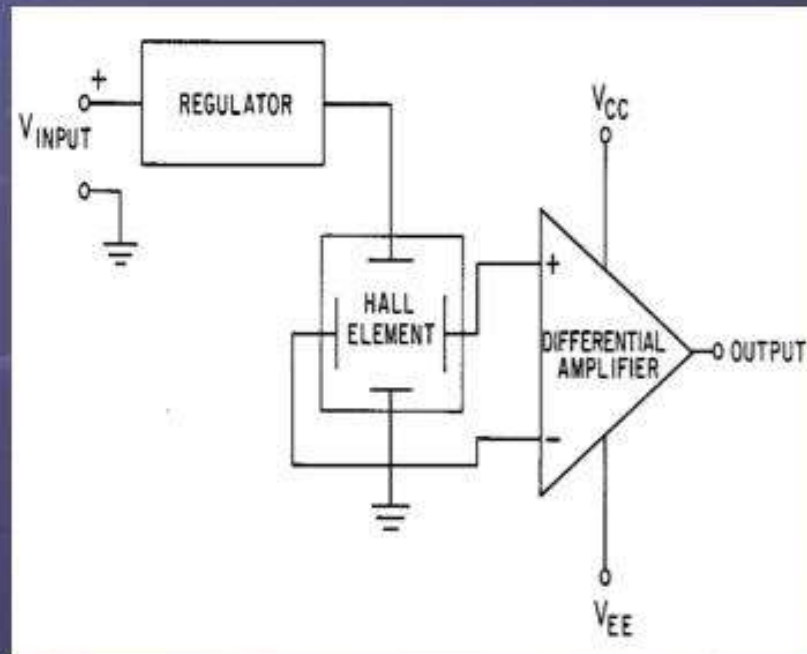
**Hall Effect Sensors Are Non Contact Sensors**

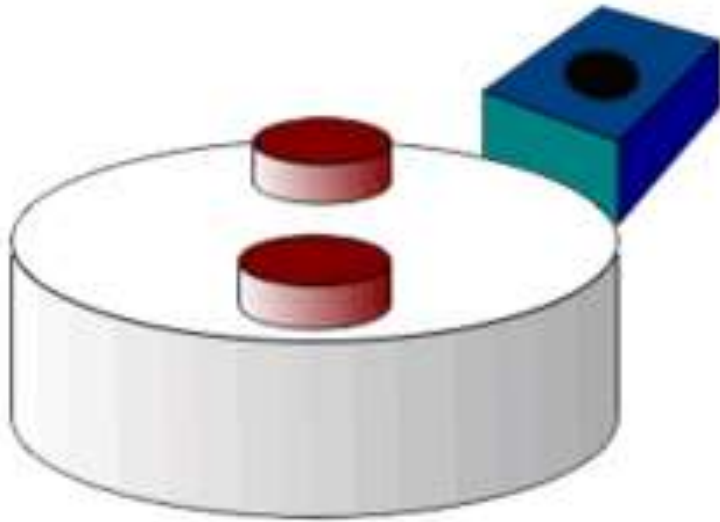


**They Can Produce Either Digital Or Analog Output Signal Depending On The Circuit Design**

# Basic Hall Effect Sensor

- **Hall element** is the basic magnetic field sensor
- **Differential Amplifier** amplifies the potential difference (Hall voltage)
- **Regulator** holds current value so that the output of the sensor only reflects the intensity of the magnetic field





a wheel containing two magnets passing by a Hall effect sensor. The voltage from the sensor peaks twice for each revolution. This arrangement is used to measure and regulate the speed of rotating objects, including disk drives.

## Hall effect magnetometer

The most common magnetic sensing devices are solid-state Hall effect sensors.

These sensors produce a voltage proportional to the applied magnetic field and also sense polarity.

They are used in applications where the magnetic field strength is relatively large, such as in anti-lock braking systems in cars, which sense wheel rotation speed via slots in the wheel disks.

## Speed sensors

A speed sensor is used to determine the acceleration or deceleration of the wheel. These sensors use a magnet and a Hall effect sensor, or a toothed wheel and an electromagnetic coil to generate a signal. The rotation of the wheel or differential induces a magnetic field around the sensor. The fluctuations of this magnetic field generate a voltage in the sensor. Since the voltage induced in the sensor is a result of the rotating wheel, this sensor can become inaccurate at slow speeds. The slower rotation of the wheel can cause inaccurate fluctuations in the magnetic field and thus cause inaccurate readings to the controller.