

4 LAB SESSION 4

To obtain the axle speed value using a Hall Effect position sensor

4.1 Learning Objective:

At the end of this study, the student will be able to:

- To use different parts of Tachometer Test Module such as Hall Effect Sensor, power supply, differential amplifier.

4.2 Apparatus

In order to complete the demonstration, we need a number of pieces of equipment.

- Hall Effect Sensor
- DC motor
- 12V DC power supply • 5V DC power supply
- Counter.

4.3 Main Parts of Tachometer Test Module

1. DC Tachometer
2. DC Motor
3. Inductive Sensor
4. Refractive Infrared Sensor
5. Slot Sensor
6. Hall Effect Sensor

4.4 Encoder Related theory

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.

In its simplest form, the sensor operates as an analogue transducer, directly returning a voltage. With a known magnetic field, its distance from the Hall plate can be determined. Using groups of sensors, the relative position of the magnet can be deduced.

Frequently, a Hall sensor is combined with threshold detection so that it acts as and is called a switch. Commonly seen in industrial applications such as the pictured pneumatic cylinder, they are also used in consumer equipment; for example some computer printers use them to detect missing paper and open covers. They can also be used in computer keyboards applications that require ultra-high reliability.

Hall sensors are commonly used to time the speed of wheels and shafts, such as for internal combustion engine ignition timing, tachometers and anti-lock braking systems. They are used in brushless DC electric motors to detect the position of the permanent magnet. In the pictured wheel with two equally spaced magnets, the voltage from the sensor will peak

twice for each revolution. This arrangement is commonly used to regulate the speed of disk drives.

4.5 Experimental procedure:

- 1) Set up the equipment and identify its components.
- 2) In this experiment Hall Effect position sensor is used that provides a signal which has got constant amplitude and changeable frequency depending apparatus centre axle rotation speed.

4.6 Observations & Calculations

Table4.1: Calculation of input of motor and mass speed of motor

Obs. <i>n</i>	Input of motor (V)	Speed Rev/sec)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

4.7 Graph

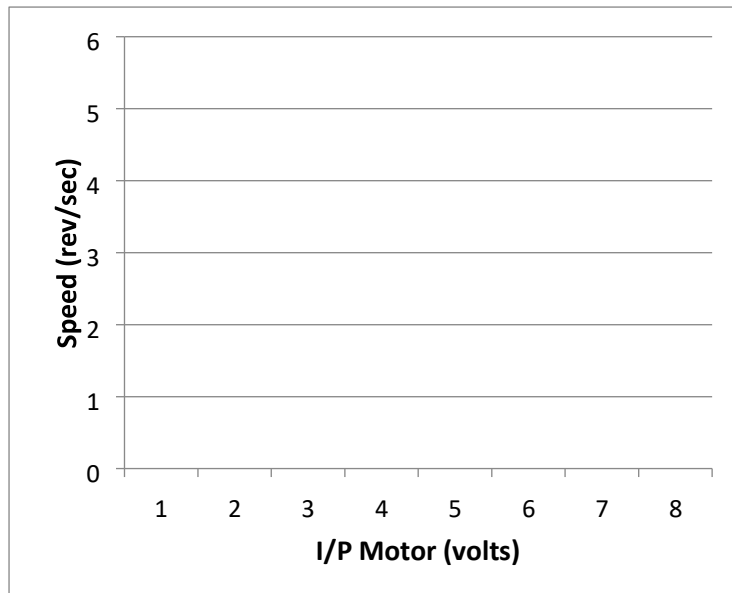


Figure 4-2 Characteristics of Hall Effect Sensor

4.8 Conclusion: