KY-024 Linear Magnetic Hall Effect Sensor Module - Detailed Explanation

The **KY-024 Hall Effect Sensor Module** is a **magnetic field detection sensor** that uses the **Hall Effect** to measure the presence and strength of a magnetic field. It provides both **digital** and **analog** outputs, making it useful for detecting **magnet proximity, direction, and strength**.

What is the KY-024 Hall Effect Sensor?

The KY-024 module is based on a **linear Hall effect sensor** (typically an **A3144, SS49E, or similar sensor**) and includes additional components such as an **operational amplifier (comparator), potentiometer, and indicator LEDs** for easier signal processing.

Hall Effect Principle:
The Hall Effect describes the creation of a voltage difference across an electrical conductor when it is exposed to a **perpendicular magnetic field**. This voltage is **proportional** to the strength of the magnetic field and can be used to measure its **polarity and intensity**.

Components of the KY-024 Module

Component	Function
Hall Sensor (SS49E/A3144/Other)	Detects the presence and strength of a magnetic field
LM393 Comparator	Converts the analog signal into a digital HIGH/LOW output
Potentiometer	Adjusts the sensitivity for the digital threshold
Power LEDs	Indicates power and signal status
Analog Output (A0)	Provides a continuous signal representing field strength
Digital Output (D0)	Outputs HIGH (1) if no field is detected, LOW (0) if a strong field is detected

How Does KY-024 Work?

- The **Hall sensor** detects a **magnetic field** and generates a voltage proportional to its strength.
- If the field is strong enough, the **digital output (D0)** will switch from HIGH to LOW, triggering an event.
- The **analog output (A0)** provides a **continuous voltage** representing the field's strength and polarity.
- The **potentiometer** adjusts the **threshold sensitivity** for digital output.

Digital Output Behavior (D0)

Magnetic Field	D0 Output	LED State
No Magnet	HIGH (1)	OFF
Strong North/South Pole	LOW (0)	ON

Uses of KY-024

Contactless Switches – Used in industrial machines for contactless sensing.
Speed Measurement – Detects RPM (Rotations Per Minute) in motors.
Position Sensing – Measures object displacement.
Magnetic Field Detection – Detects nearby magnets, useful in door security systems.
Electric Current Measurement – Indirectly measures electric currents.
Robotics & Automation – Detects magnetic tracks for guided robots.

KY-024 vs. Other Hall Effect Sensors

Feature	KY-024	KY-003	KY-035
Output Type	Digital & Analog	Digital Only	Analog Only
Hall Sensor Type	Linear	Switch	Linear
Adjustable Sensitivity	Yes	No	No
Use Case	Strength & Polarity Measurement	Simple Detection	Strength Measurement

Summary

The **KY-024 Hall Effect Sensor Module** is a **versatile** and **sensitive** magnetic field detector that provides both **analog (A0)** and **digital (D0) outputs**. It is widely used in **automation, security systems, robotics, and motor speed sensing**. Its adjustable **sensitivity potentiometer** makes it highly customizable for different applications.

Fun Fact: The Hall Effect is used in **electric guitars**, **speedometers**, and even **magnetic levitation trains**!