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GODIYMODULES P3022

GODIYMODULES P3022 12-Bit Hall Angle Sensor Instruction Manual

Model: P3022

1. Introduction

The GODIYMODULES P3022 is a non-contact Hall effect angle sensor designed for precise rotational angle measurement. Utilizing electromagnetic induction principles, this sensor converts mechanical rotation into a proportional electrical signal. It is engineered for durability and accuracy in various industrial applications.

2. Key Features

- **Full 360° Measurement:** Provides continuous, no-dead-angle rotational angle detection.
- **High Resolution:** Offers a 12-bit resolution, translating to 0.088° per step.
- **Excellent Linearity:** Achieves a linearity of ±0.3% F.S. (Full Scale).
- **Standard Output:** Delivers a 0-5V DC analog output signal.
- **Standard Supply Voltage:** Operates with a 5V DC power supply.
- **Clockwise Angle Direction:** The sensor measures angle based on clockwise rotation of its shaft.
- **Compact Design:** Features a small form factor with a maximum outer diameter of 22mm.
- **Durable Construction:** Encased in a hard aluminum alloy shell with high-quality imported stainless steel high-speed bearings for extended lifespan and minimal friction.
- **Easy Installation:** Designed for straightforward integration into systems.

3. Specifications

Parameter	Value
Model Number	P3022
Angle Range	0-360° (Full Circle)
Resolution	12-Bit (0.088°)

Linearity	±0.3% F.S.
Output Signal	0-5V DC
Supply Voltage	5V DC
Angle Direction	Clockwise Rotation
Maximum Outer Diameter	22mm
Product Dimensions (L x W x H)	3.15 x 1.57 x 1.57 inches
Item Weight	0.03 Kilograms (1.06 ounces)
Material	Aluminum, Stainless Steel

4. Setup and Installation

Follow these steps for proper installation and wiring of your P3022 Hall Angle Sensor:

1. **Mounting the Sensor:** Securely attach the sensor to your application using the provided mounting holes. The sensor typically comes with a mounting plate and screws for this purpose.
2. **Shaft Alignment:** Align the sensor's rotary shaft with the rotating component whose angle you wish to measure. Ensure the shaft can rotate freely without obstruction. The angle measurement is based on clockwise rotation.
3. **Wiring Connections:** The sensor has three primary connection pins: VCC, OUT, and GND. Refer to the image below for pin identification.



Figure 1: Close-up of the sensor's connection pins (VCC, OUT, GND).

- **VCC:** Connect to a stable 5V DC power supply.
- **GND:** Connect to the ground of your power supply and measurement system.
- **OUT:** Connect to the analog input of your data acquisition system, microcontroller, or other measurement device.

Important: Ensure correct wiring polarity for VCC and GND to prevent damage to the sensor.



Figure 2: P3022 sensor with its mounting plate and screws.



Figure 3: Sensor with mounting plate attached, ready for installation.

5. Operating Instructions

Once the sensor is correctly installed and wired, it is ready for operation:

1. **Power On:** Apply 5V DC power to the VCC and GND pins.
2. **Angle Measurement:** As the sensor's shaft rotates, the output voltage on the OUT pin will change proportionally to the angle. The 0-5V DC output range corresponds to the full 360° rotation.
3. **Data Acquisition:** Use your connected data acquisition system or microcontroller to read the analog voltage from the OUT pin. This voltage can then be converted back into an angular value using a simple linear scaling function (e.g., Angle = (Output Voltage / 5V) * 360°).



Figure 4: Bottom view of the sensor, indicating quality control.

6. Maintenance

The P3022 sensor is designed for long-term, low-maintenance operation due to its non-contact Hall effect technology. However, periodic checks can help ensure optimal performance:

- **Physical Inspection:** Periodically inspect the sensor for any signs of physical damage, corrosion, or loose mounting.
- **Connection Integrity:** Verify that all electrical connections (VCC, OUT, GND) remain secure and free from oxidation.
- **Environmental Protection:** While the aluminum shell provides protection against common industrial elements like water, oil, vibration, and shock, avoid exposing the sensor to extreme conditions beyond its specified operating environment. Keep the sensor free from excessive dust or debris accumulation.
- **Shaft Movement:** Ensure the rotary shaft moves smoothly and is not impeded by any foreign objects or excessive friction from the connected mechanism.

7. Troubleshooting

If you encounter issues with your P3022 sensor, consider the following troubleshooting steps:

7.1 No Output or Incorrect Readings

- **Power Supply:** Verify that the sensor is receiving a stable 5V DC power supply. Measure the voltage between VCC and GND pins.
- **Wiring:** Double-check all wiring connections (VCC, OUT, GND) for correct polarity and secure contact. A loose or incorrect connection is a common cause of issues.
- **Shaft Obstruction:** Ensure the sensor's rotary shaft is not physically obstructed and can rotate freely through its full 360° range.
- **Measurement Device:** Confirm that your data acquisition system or microcontroller's analog input is correctly configured to read a 0-5V DC signal. Check its input impedance and sampling rate.

7.2 Inconsistent or Noisy Readings

- **Electromagnetic Interference (EMI):** The sensor is designed to be robust against EMI, but strong external magnetic fields or electrical noise sources can affect readings. Try to isolate the sensor from such sources or use shielded cables.
- **Vibration:** While the sensor is resistant to vibration, excessive mechanical vibration can potentially introduce noise. Ensure secure mounting and consider vibration isolation if necessary.
- **Grounding:** Ensure proper grounding of both the sensor and your measurement system to avoid ground loops or noise.
- **Linearity Check:** If readings are consistently off, verify the linearity of your system's angle-to-voltage conversion against the sensor's ±0.3% F.S. specification.

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