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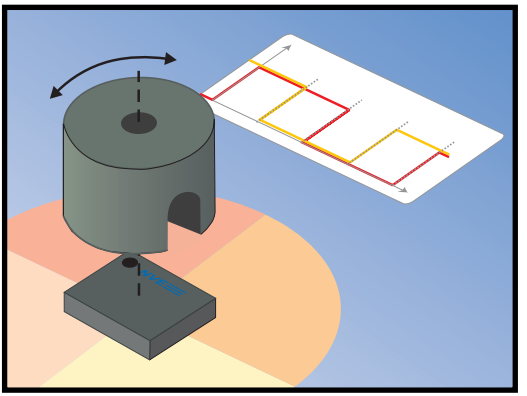
NVE CORPORATION

AG932-07E
Rotation Sensor
Evaluation Kit



SB-00-047A

NVE Corporation (800) 467-7141 sensor-apps@nve.com www.nve.com

Kit Overview

Included in the Evaluation Kit

- ADT002-10E rotation sensor
- Part # 12426 split-pole Alnico 5 round horseshoe magnet
- Circuitry and indicators for direction and quadrant
- Plastic magnet locating fixture
- Battery powered

ADT001/ADT002 Sensor Features

- Extremely low power (3 μA typ. at 3.3 V)
- Wide airgap tolerance
- Integrated fault detection
- 2.4 V to 5.5 V supply range
- –40°C to +125°C operating range
- Ultraminiature TDFN6 package

ADT001/ADT002 Applications

- Water meters
- Rotational speed sensors
- Rotational position sensors

ADT001/ADT002 Sensor Description

The ADT001 and ADT002 rotation sensors are ultralow power, digital-output magnetic rotational sensors. Two outputs are 90 degrees out of phase to provide directional information. The ADT001 is high hysteresis for high noise immunity in applications such as speed sensing; the ADT002 is low hysteresis to provide accurate, absolute rotational quadrant information.

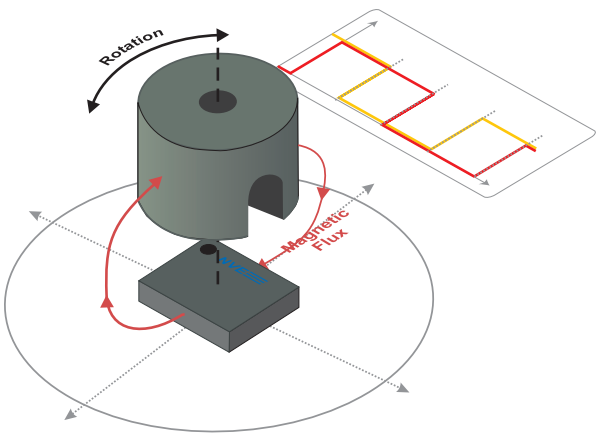
An additional output indicates a fault if the magnetic field is too high for accurate measurements. This can occur if the magnet is too close to the sensor, or with interference from an adjacent magnet.

The heart of the unique sensor is an array of four Tunneling Magnetoresistance (TMR) elements in each quadrant. TMR technology enables low power and miniaturization, making the sensors ideal for battery operation.

*Visit **www.nve.com** for complete product specifications and reference designs.*

Quick Start

⇒ Place the horseshoe magnet in the Plexiglas pocket.
⇒ Ensure both power jumpers are in place.
⇒ Turn the power switch ON.
⇒ Rotate the magnet and observe the indicator LEDs.
⇒ Turn the power OFF when not in use so the LEDs do not drain the battery.

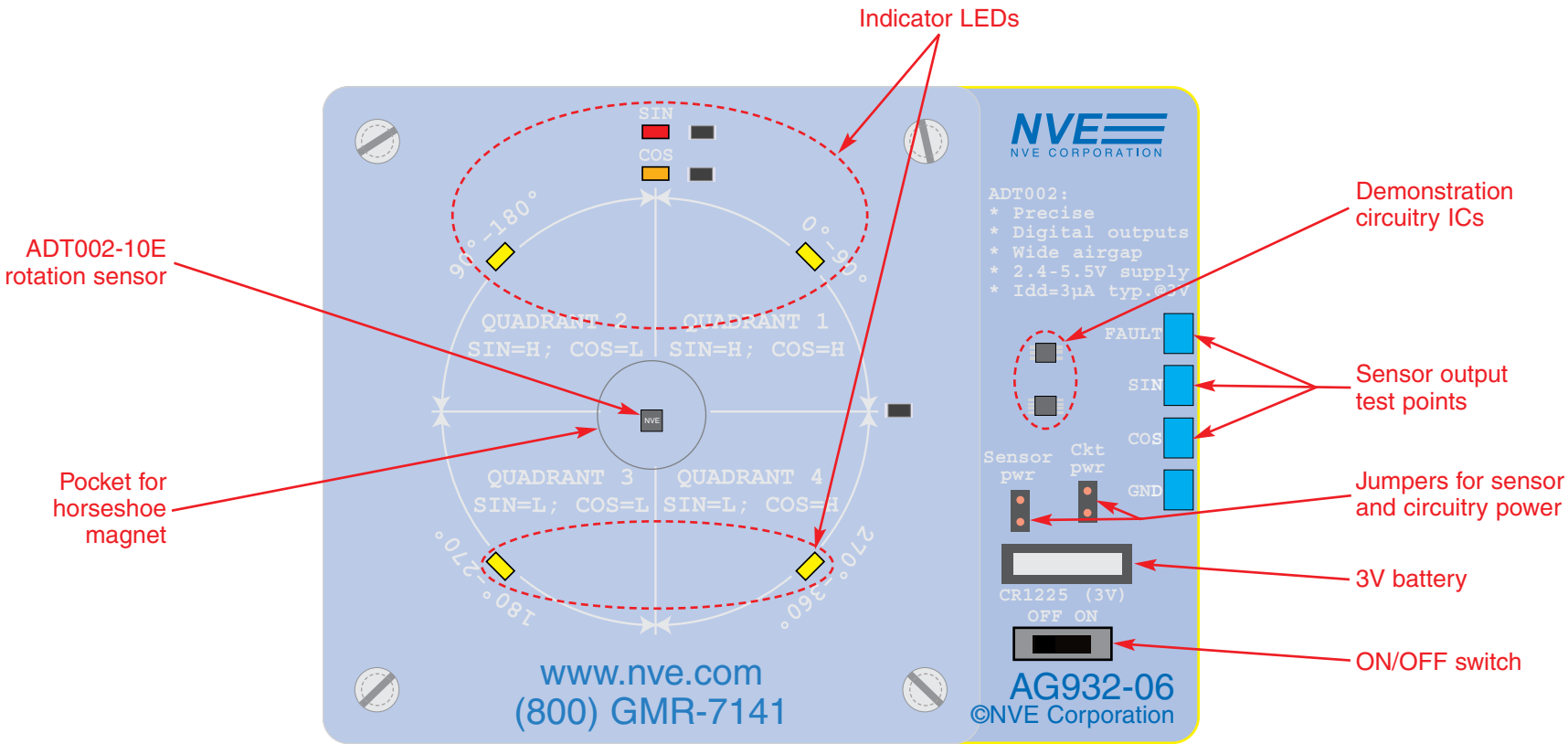


Magnets

The sensor is accurate over a wide range of magnet spacing, especially with the relatively strong magnet provided with the kit. Smaller or weaker magnets may require closer spacing.

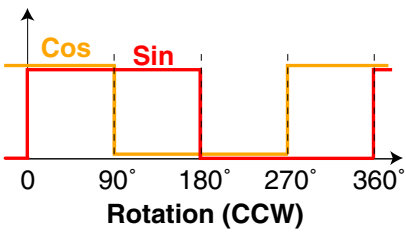
Low-cost radially-magnetized ferrite disk magnets can be used with these sensors in production. Bar magnets can also be used in some configurations.

Evaluation Board Layout



Overview of Operation

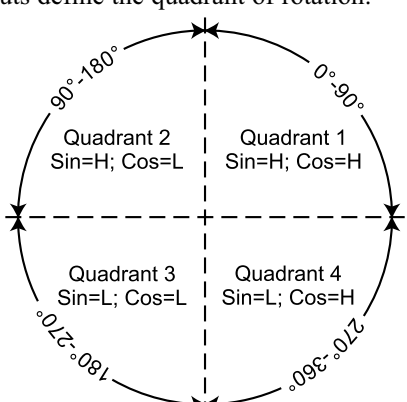
ADT00X sensors contain four sensor elements—one in each quadrant. In a typical sensor configuration, an external magnet provides a saturating magnetic field (30 to 200 Oe) in the plane of the sensor, as demonstrated in this kit. Mathematically, the outputs correspond to the sign of the sine and cosine of the rotation, i.e., sgn(sinθ) and sgn(cosθ), as shown below:



The sensor truth table is as follows:

	Output	
Angle	Sin	Cos
0˚-90˚	H	H
90˚-180˚	H	L
180˚-270˚	L	L
270˚-360˚	L	H

Thus the sensor outputs define the quadrant of rotation:

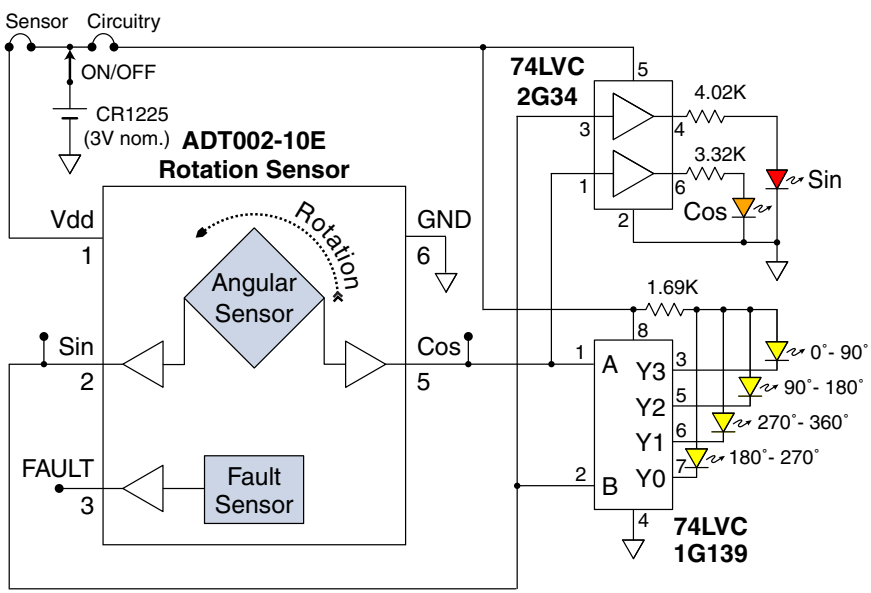


Evaluation Board Circuitry

The PCB assembly includes simple circuitry to drive LEDs from the sensor outputs.

A 3-volt lithium button cell powers the evaluation board. Jumpers allow the circuitry to be disabled or powered separately, or jumper connections can be used to monitor the remarkably low sensor supply current.

The indicator LEDs are driven by 74LVC-Series CMOS logic. A 74LVC2G34 buffer drives red and orange indicator LEDs for the Sin and Cos sensor outputs. A 74LVC1G139 decodes the sensor truth table, providing four outputs that drive the quadrant-indicating yellow LEDs.



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