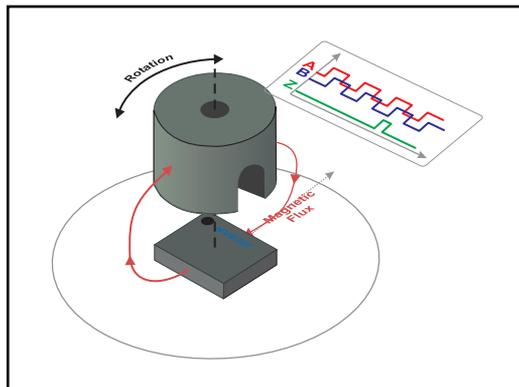


AG964-07E ABZ TMR Encoder Sensor Demonstration Kit



SB-00-120

Kit Overview

Included in the Demonstration Kit

- ASR022-10E ABZ Noncontact TMR Encoder Sensor
- Part # 12426 split-pole Alnico 5 round horseshoe magnet
- A four-digit display to indicate rotation
- LEDs for A, B, Z, and Direction outputs
- Plastic magnet locating fixture
- Powered by two AAA batteries (included)

ASR022 Sensor Features

- Optical encoder replacement
- Inherent dust and contaminant immunity
- Up to 15,000 RPM
- Wide airgap tolerance
- 512 virtual lines (128 cycles) per revolution
- -40°C to 125°C operating range
- Ultraminiature 2.5 x 2.5 mm DFN package

ASR022 Applications

- Motion control
- Robotics
- Automotive applications
- Internet of Things (IoT) end nodes

ASR022 Sensor Description

ASR022 noncontact TMR encoder sensors provide precise pulses indicating angular motion, and is smaller, lower power, and more accurate than other magnetic encoders.

An industry-standard ABZ interface allows the ASR022 to replace legacy optical encoders and provide noncontact operation, wide mechanical tolerance, and inherent dust and contaminant immunity.

The sensor combines precise, low-power Tunneling Magnetoresistance (TMR) sensing elements with sophisticated digital signal processing.

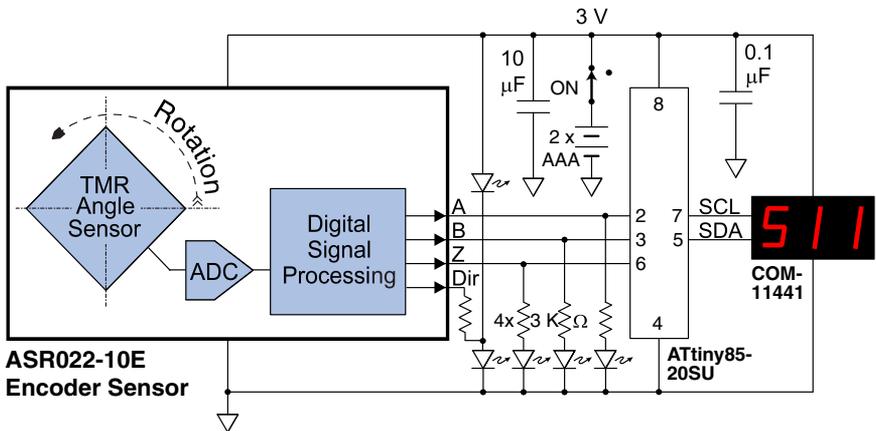
Visit www.nve.com for complete specifications.

Evaluation Board Circuitry

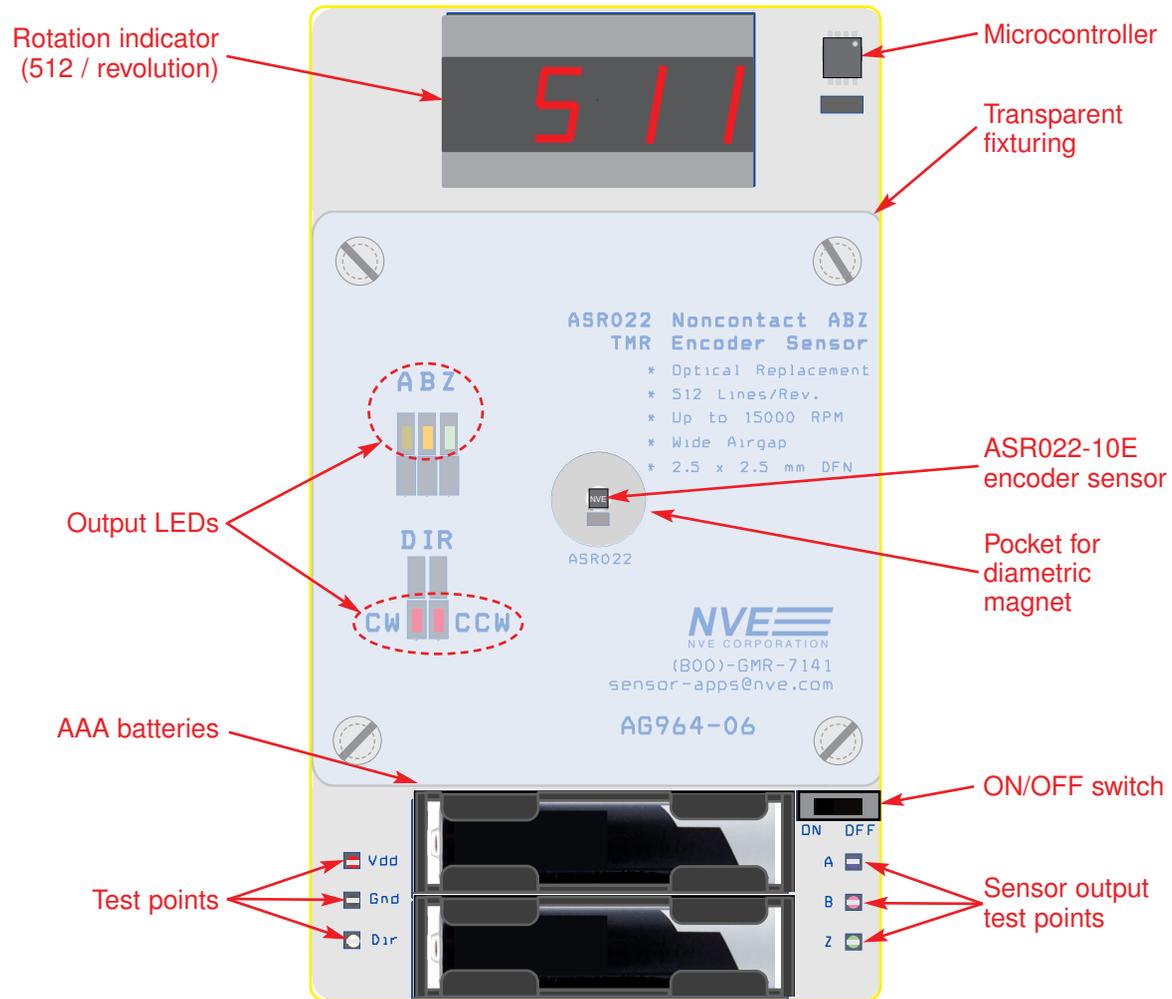
The PCB assembly includes LED indicators for the sensor's A, B, Z, and Direction outputs.

An inexpensive 8-pin microcontroller counts the sensor's output pulses, resets the count when a "Z" pulse is detected, and drives a seven-segment display that serves as a pulse counter.

The board is powered by two 1.5 V AAA alkaline batteries.

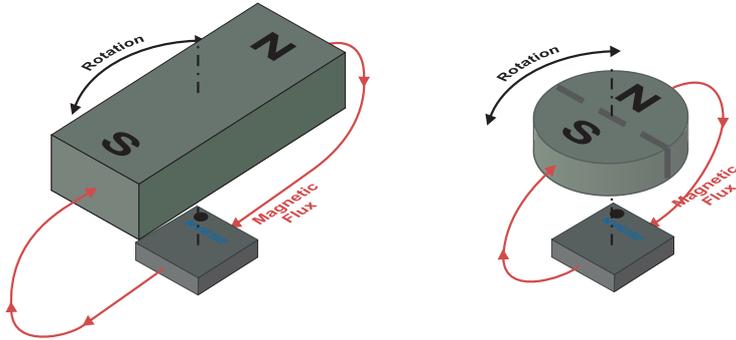


Evaluation Board Layout

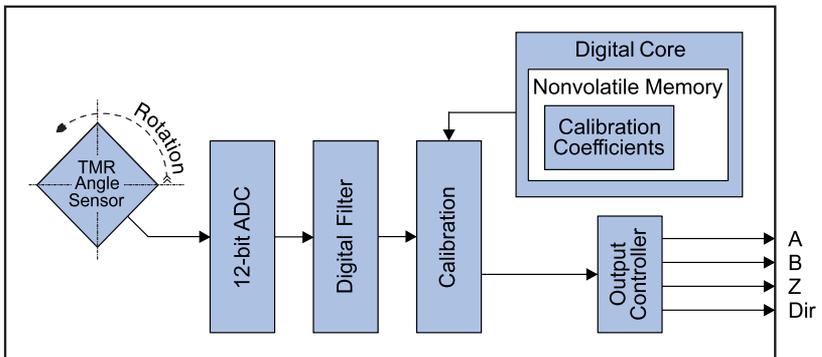


Operation

The heart of the ASR022 is a tunneling magnetoresistive (TMR) sensor element. In a typical configuration, an external magnet provides a magnetic field of 6 to 20 mT (60 to 200 Oe) in the plane of the sensor, as illustrated below for a bar magnet and a diametrically-magnetized disk magnet:

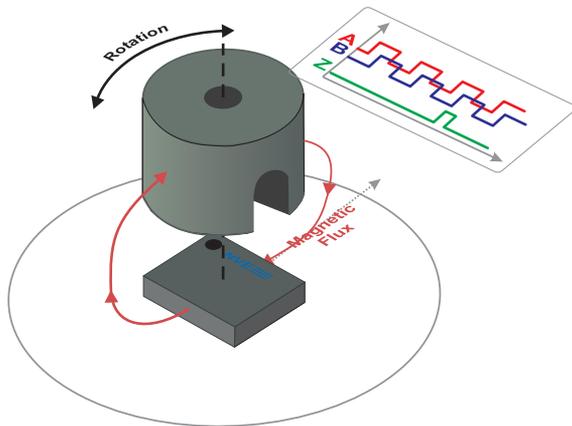


The sensor output is digitized with a 12-bit ADC, with the extra bits ensuring precision and computational accuracy. Factory-programmed signal conditioning is combined with a temperature sensor and digital linearization:



Quick Start

- ⇒ Place the horseshoe magnet in the Plexiglas pocket.
- ⇒ Turn the power switch ON.
- ⇒ Rotate the magnet and observe the indicator LEDs and the pulse count.
- ⇒ Observe the pulse count on the seven-segment display.
The count should reset with each Z pulse.
- ⇒ Turn the power OFF when not in use to avoid draining the batteries.



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.

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