

Quadrature Speed and Position Sensing in Industrial Speed Applications Using Multipole Ring Magnet/Encoder Targets

An Application Note

Background

Industrial equipment design engineers are looking for larger air gap solutions that are not susceptible to run out and sudden air gap changes. These engineers also need a solution that is not affected by jitter (repeatability over many rotations) at zero/low speed, which typically cause start/stop issues.

Potential industrial shaft speed applications include: conveyor roller speed, process line speed and direction, gearbox output speed, and positioning roller speed and direction. Commercial applications include: garage door opening systems, induction motors, fan speed systems, and electric actuated window blind position.

Solution

Product: Honeywell's VM821Q1 AMR (Anisotropic Magnetoresistive) 4-Pin Quadrature Speed and Position Sensor IC is designed for use with ring magnet encoder targets in industrial shaft speed applications (see Figure 1).

Function in application: The VM821Q sensor IC is designed to operate relative to the angle of the magnetic field. The design has been optimized for multipole ring magnet applications. The sensor ICs are inherently insensitive to variation in magnetic field strength. As these AMR sensor ICs are omnipolar, the base circuit provides one output per pole and two outputs per pole pair. The VM821Q sensor IC can be paired with a radially or axially magnetized ring magnet (see Figure 2).

The sensor IC should be packaged into an environmentally-sealed housing with appropriate mounting and termination features for the end application (see Figure 2).

Figure 1. VM821Q1 Sensor IC in Shaft Application

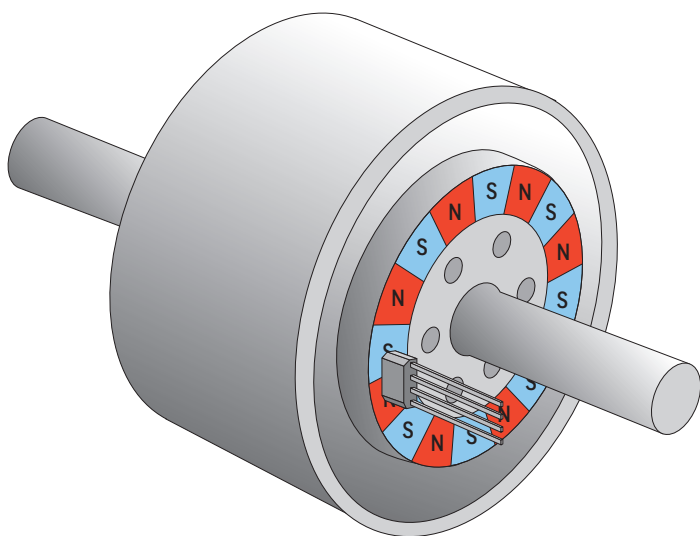


Figure 2. VM821Q1 Sensor IC (shown in probe-style housing) Mounting Orientation



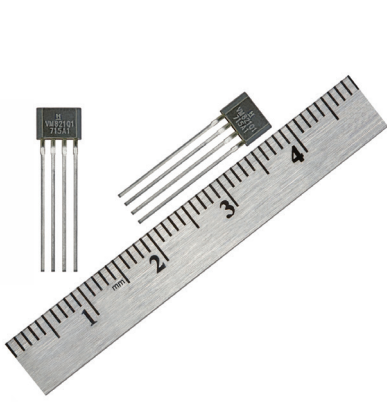
Customer Benefits

- Unique* AMR bridge design operates in saturation, allowing the sensor to work at larger air gaps and it is not affected by run out or sudden air gap changes.

*Patent Pending

- Insensitivity to magnet pole size allows one sensor to be paired with different ring magnet applications.
- Sensors may be paired with different ring magnet applications.

Table 1: VM821Q1 Sensor IC

VM821Q1 AMR 4-PIN QUADRATURE SENSOR IC		DESCRIPTION	FEATURES
		Designed to detect the speed and direction of a ring magnet encoder target using a unique bridge design. The frequency of the output is proportional to the rotational speed of the target, and the rotational direction is encoded by the phase between the outputs. The sensor IC works over a wide range of speeds, temperatures and air gaps.	<ul style="list-style-type: none"> • Integrated quadrature sensor IC • Pole size independent operation • 4-pin quadrature, open collector output • -40°C to 150°C operating temperature range • Zero speed operation • No calibration required • Insensitive to mechanical vibration • Protection against reverse polarity and short circuit

For more information

Honeywell Sensing and Internet of Things services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit sensing.honeywell.com or call:

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007082-2-EN | 2 | 10/18
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