Differential Magnetoresistive Sensor CY-DMR-03

Features

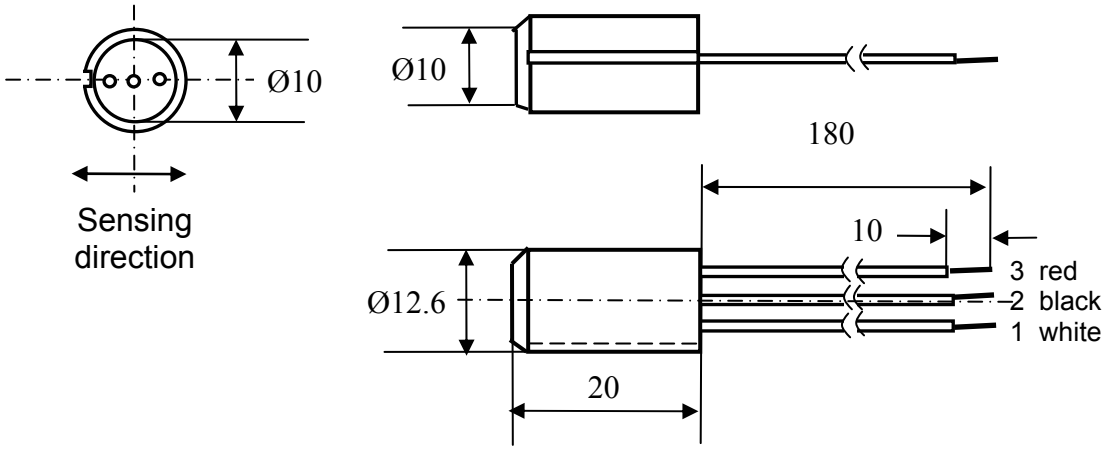
- Sensing over wide rotation speed range (0~100kHz)
- Robust metallic or plastic housing
- Signal amplitude is speed independent
- Biasing magnet built in
- Best suited for harsh environments

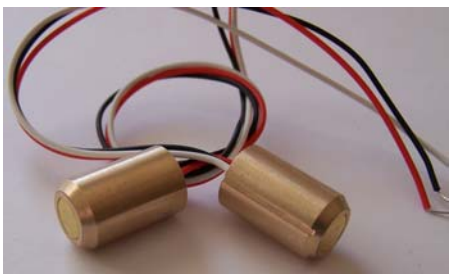
Typical applications

- Rotation speed detection
- Rotation position detection
- Proximity Switch
- Angle encoder
- Linear position sensing

The differential magnetoresistive sensor CY-DMR-03 consists of two series coupled magneto resistors (D-type InSb/NiSb semiconductor resistors whose value can be magnetically controlled), which are mounted onto an insulated ferrite substrate. The sensor is encapsulated in a metallic package and has 3 connection terminals. The basic resistance of the total system is 2 x 250Ω. A permanent magnet, which supplies a biasing magnetic field, is fixed on the base of the sensor.

Sensor Outline





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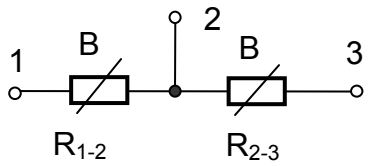
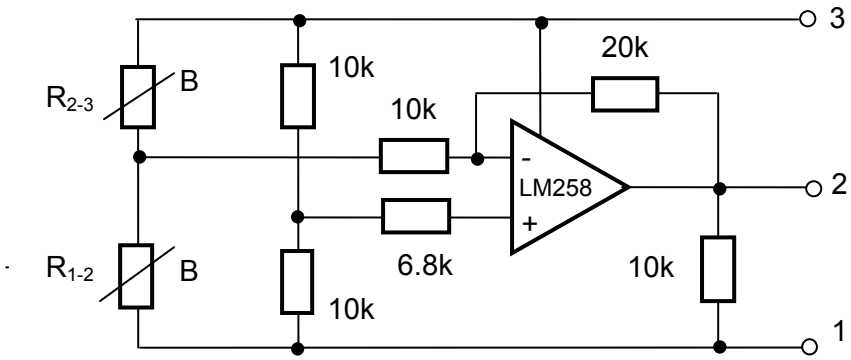
Sensor Circuits

a) Without Amplifier



3: V+ power supply (+5V),
2: V_{out} Output signal,
1: GND

b) Built-In Inner Amplifier



3: V+ (+5V),
2: V_{out} Output signal,
1: GND

Specifications

Part numbers	CY-DMR-03A	CY-DMR-03B
Built-in Inner amplifier	no	yes
Maximum power supply V_{max}	10V DC	5.5V DC
Nominal power supply	5V DC	5V DC
Inner total resistance R_{1-3} ($\delta=\infty$, I≤mA, t=25°C)	700 Ω – 1500 Ω	700 Ω – 1500 Ω
Center symmetry M=100% (R_{1-2}-R_{2-3})/R_{1-2} ($\delta=\infty$)	≤10%	≤10%
Offset voltage (at Vin and $\delta=\infty$)	≤ 130mV	≤ 130mV
Open circuit output voltage $V_{out\ pp}$ (at Vin and δ=0.15mm)	≥1100mV	3500mV
Frequency range	0-100kHz	0-100kHz
Operating temperature	-20°C ~ +80°C	-20°C ~ +80°C
Storage temperature	-40°C ~ +85°C	-40°C ~ +85°C

Standard target object: 1.8x5x4mm (1.8x5mm face moves in the sensing direction of the sensor).

Cross Reference

Part number	**Cross reference**
CY-DMR-03A	MuRata FR05CM21AR
CY-DMR-03B	---

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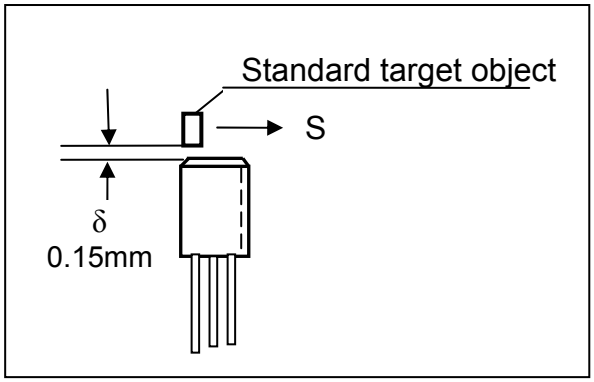
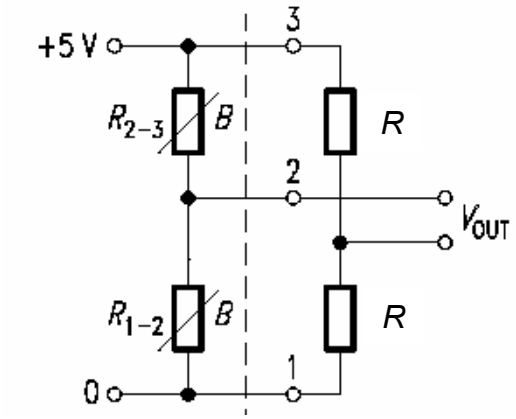
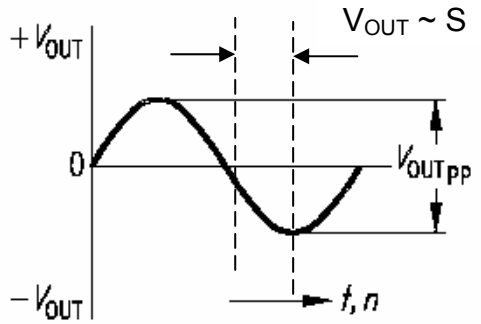
Measurement Arrangement

A measuring bridge is used for applications of the magnetoresistive sensor CY-DMR-03. The resistance of the sensor is changed by approaching a small soft iron part (standard target object) close to it. As result an output voltage change of measuring bridge is caused by the resistance change (see below).

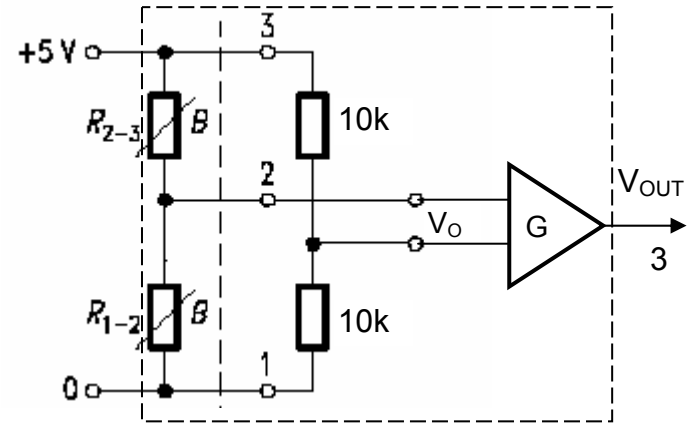


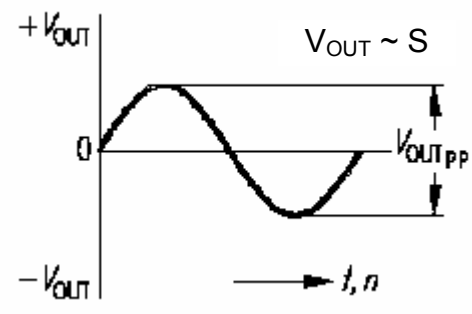
Sensor CY-DMR-03A





Sensor CY-DMR-03B





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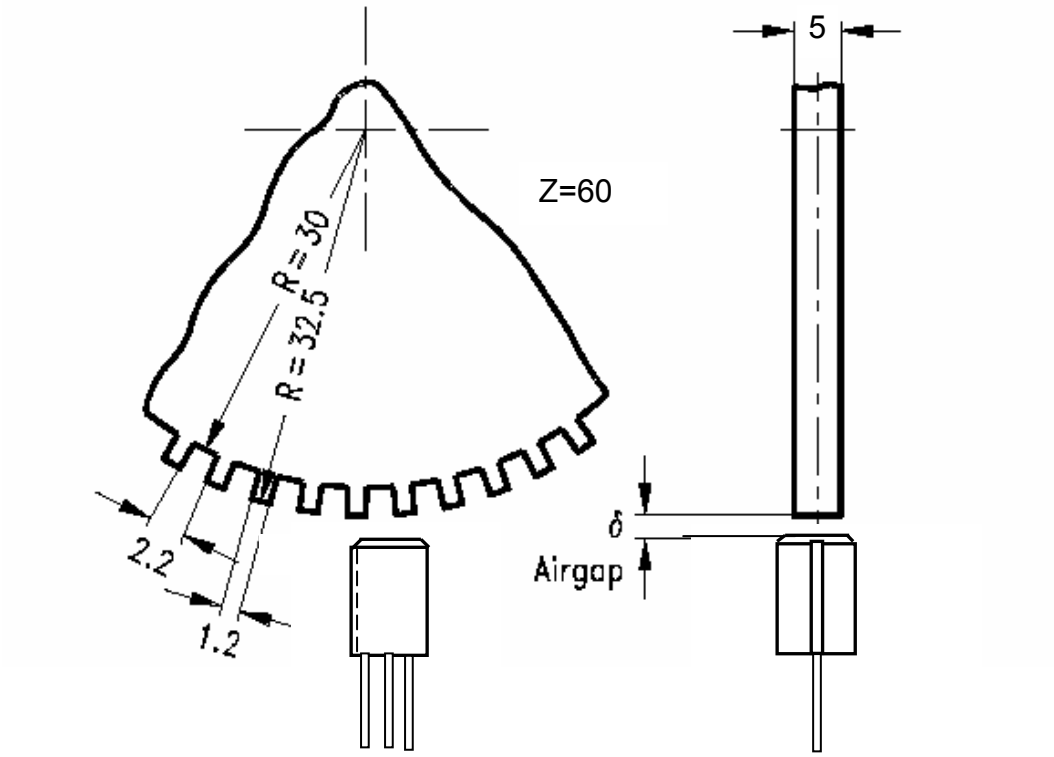
To convert small distance into a proportional electric signal, one can use a small soft iron part with definite width (e.g. b=1.8mm) to move over the face of the sensor. A linear signal up to 1.5mm can be obtained in this way. The sinusoidal signal gives a voltage output proportional to the distance in the zero crossover region.

For digital revolution counting, the sensor should be actuated by a magnetic soft iron tooth wheel. The tooth spacing should correspond to about twice of the magneto resistor intercenter space i.e. 2x1.6mm.

The two resistors of the sensor are supplemented by two additional resistors in order to obtain the sensor output voltage as a bridge voltage V_{OUT}. The output voltage V_{OUT} without excitation is then 0V because the offset is compensated by the bridge circuit.



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