

Differential Magnetostrictive Sensor CY-DMR-03

Features

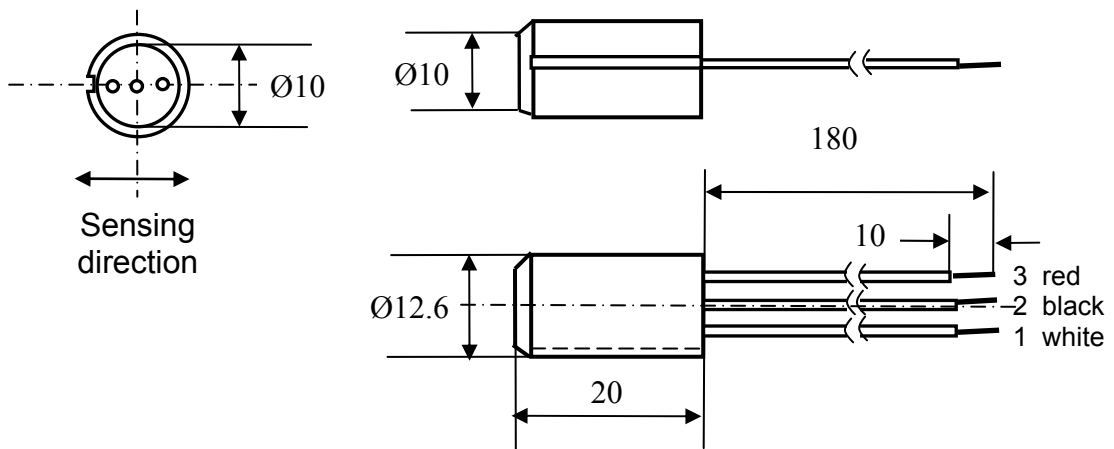
- Sensing over wide rotation speed range (0~100kHz)
- Robust metallic or plastic housing
- Signal amplitude is speed independent
- Biasing magnet built in
- Best suited for harsh environments

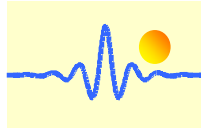
Typical applications

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

The differential magnetostrictive 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 $2 \times 250\Omega$. A permanent magnet, which supplies a biasing magnetic field, is fixed on the base of the sensor.

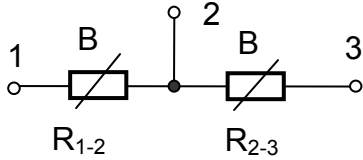
Sensor Outline





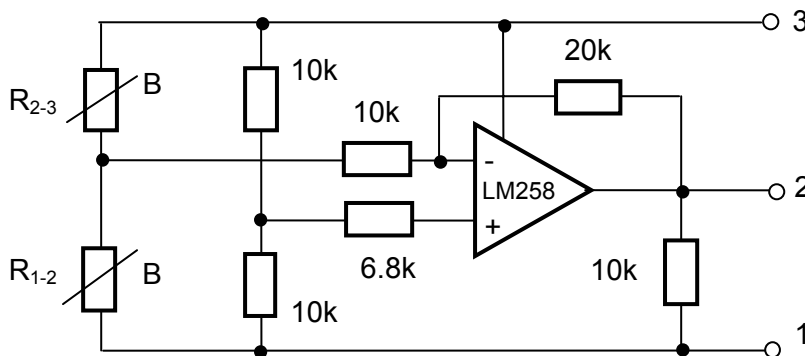
Sensor Circuits

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

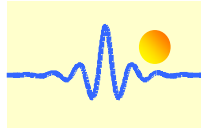
Specifications

| 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 (δ=∞, 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 (δ=∞) | ≤10% | ≤10% |
| Offset voltage (at V _{in} and δ=∞) | ≤ 130mV | ≤ 130mV |
| Open circuit output voltage V _{out pp} (at V _{in} 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).

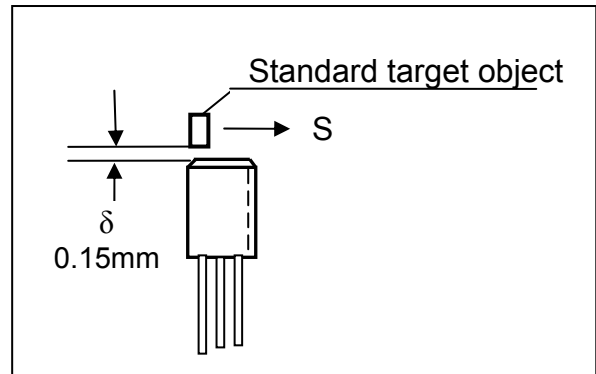
Cross Reference

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

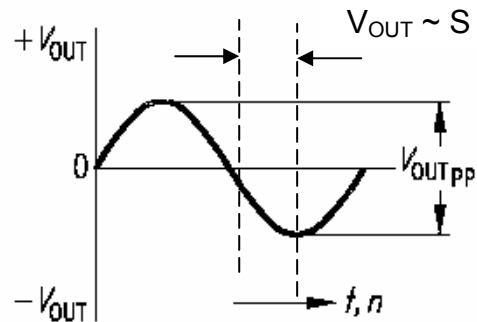
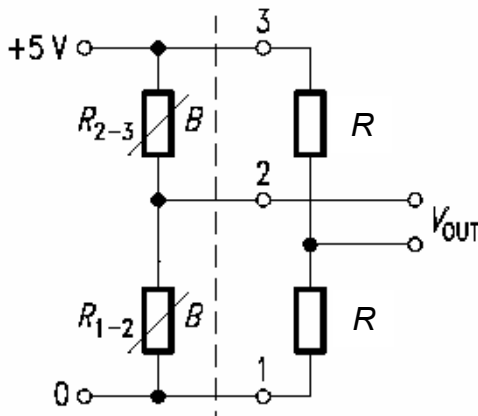


Measurement Arrangement

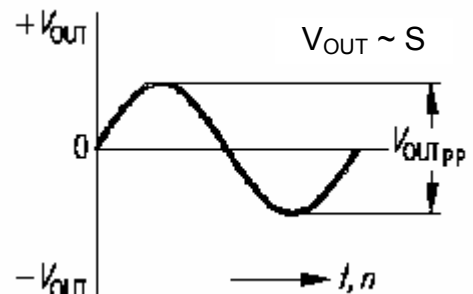
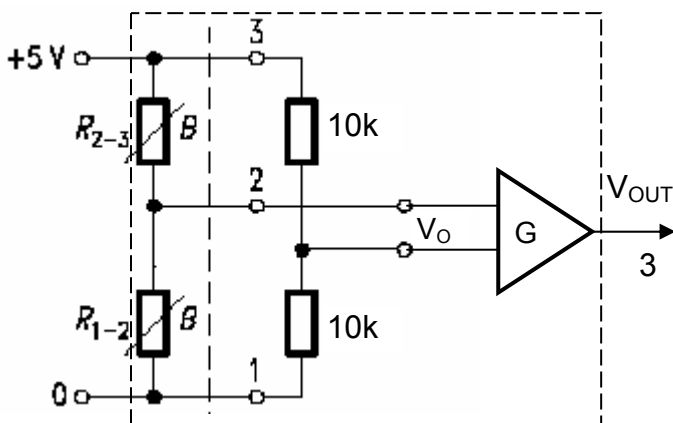
A measuring bridge is used for applications of the magnetoresistive sensor CY-DMR-03. The resistance of the sensor is changed by approaching a small soft iron part (standard target object) close to it. As result an output voltage change of measuring bridge is caused by the resistance change (see below).

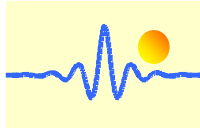


Sensor CY-DMR-03A



Sensor CY-DMR-03B





To convert small distance into a proportional electric signal, one can use a small soft iron part with definite width (e.g. $b=1.8\text{mm}$) 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. $2 \times 1.6\text{mm}$.

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.

