

TCM2™ ELECTRONIC COMPASS, MAGNETOMETER, AND TILT SENSOR MODULE

PNI Corporation's magneto-inductive sensors are not based on traditional fluxgate or magneto-resistive designs. Unlike traditional technologies, PNI's magneto-inductive sensor changes inductance due to variances in ambient magnetic field strengths. Thus, power requirements are far below conventional magnetic sensors. This makes PNI's sensors the preferred choice in a wide variety of applications.

Electronic Gimballing

Unlike mechanically gimbaled 2-axis fluxgates, the TCM2 has no mechanical moving parts. The use of 3 single-axis magnetometers and a 2-axis tilt sensor allows the TCM2 to be gimbaled electronically. Electronic gimballing is a solid-state solution to compass tilt compensation that eliminates all moving parts and mechanical impediments to performance. This advanced electronic gimballing allows for tilt ranges of up to $\pm 50^\circ$ and provides superior performance over the entire tilt range in real world conditions.

Full 3-Axis Magnetometer and 2-Axis Tilt Sensor

In addition to compass heading, the TCM2 also supplies highly accurate pitch, roll, magnetic field data and temperature information, allowing the TCM2 to replace several sensors within a system.

Accurate in Any Environment

Ferrous metals in host systems often magnetize over time, misdirecting magnetic compass readings. In addition, some systems also generate soft iron distortions. Soft iron can either misdirect or magnify existing magnetic fields, making calibration extremely difficult. The TCM2 uses advanced electronics and correction algorithms to counter the effects of hard and soft iron, enabling it to maintain a high degree of accuracy even in the most demanding environments.

Designed to Work in the Real World

The TCM2's advanced technology allows you to design your system to cope with the challenges of your application. Plus, the command set is designed with flexibility and adaptability in mind: many of the parameters are user-programmable.

TCM SPECIFICATIONS

TCM2-20

TCM2 electronic compass sensor module with tilt compensation of $\pm 20^\circ$.

Heading Information

Accuracy when level: 0.5° RMS
Accuracy when tilted: 1.0° RMS
Resolution: 0.1°
Repeatability: $\pm 0.1^\circ$

Tilt Information

Accuracy: $\pm 0.2^\circ$
Resolution: 0.1°
Repeatability: $\pm 0.2^\circ$
Range: $\pm 20^\circ$

TCM2-50

TCM2 electronic compass sensor module with tilt compensation of $\pm 50^\circ$.

Heading Information

Accuracy when level: 1.0° RMS
Accuracy when tilted: 1.5° RMS
Resolution: 0.1°
Repeatability: $\pm 0.3^\circ$

Tilt Information

Accuracy: $\pm 0.4^\circ$
Resolution: 0.3°
Repeatability: $\pm 0.3^\circ$
Range: $\pm 50^\circ$

PERFORMANCE OF THE TCM2-20 AND TCM2-50

Magnetic Field Information

Absolute Accuracy: $\pm 1 \mu\text{T}$ up to 70 μT
Resolution: 0.01 μT
Repeatability: $\pm 0.2 \mu\text{T}$
Range: $\pm 80 \mu\text{T}$

Temperature Information (sensor is uncalibrated)

Accuracy after calibration: $\pm 1^\circ \text{C}$, $\pm 2^\circ \text{F}$
Resolution: $\pm 1^\circ \text{C}$, $\pm 2^\circ \text{F}$
Range: -20° to 70°C

Power Requirements

Supply Voltage: +5 VDC regulated or
6 to 18 VDC unregulated
Current: *Note: This is for version 2.82K only*
Operating standard mode: 15-20 mA (depending on user configuration)
Operating low power mode: 7-13 mA (depending on user configuration)
Sleep mode: 2.5 mA

CHARACTERISTICS OF THE TCM2-20 AND TCM2-50

Physical Measurements

Dimensions: 2.50" x 2.00" x 1.25"
Weight: 1.6 ounces

Environmental Characteristics

Operating Temperature: -20° to 70°C
Storage Temperature: -30° to 90°C

Interfaces

Digital: RS232C
NMEA0183
Analog: 0-5 V linear, 19.53 mV resolution (256 discrete levels)
0-5 V quadrature (sine and cosine)

FEATURES OF THE TCM2-20 AND TCM2-50

- Built-in hard iron distortion correction system with advanced automatic hard iron calibration algorithms. Soft iron correction system available if needed.
- Compass heading, pitch, roll, 3-axis magnetometer and temperature outputs are all available from the TCM2.
- Distortion Detection: raises a warning flag when magnetic disturbances, such as nearby ferrous metals and electrical currents, compromise accuracy.
- User selectable sampling rate of 1Hz to 30Hz.
- Optional heading damping.

Specifications subject to change without notice

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Developed by PNI America's premier sensor technology company.

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