

TAC-440

Quartz MEMS Tactical Inertial Measurement Unit

emcore®



DATASHEET | DECEMBER 2023

A New Era in Navigation



Applications

- Precision Aircraft Attitude Heading Reference Systems
- GPS-Aided Navigation Systems
- Autonomous Vehicles
- Remotely Operated Vehicles
- Tactical Weapons & Torpedoes
- Aerial and Marine Geomapping / Surveying
- Targeting & Pointing Systems
- Robotics

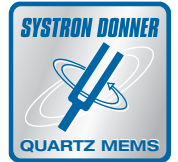
Key Performance Features

- 1°/hr Gyro Bias Over Wide Temperature Range
- 0.05°/√hr Angle Random Walk (ARW)
- < 1.0 seconds Valid Data Start Up
- 5 in.³ Compact Size
- Stable Performance, Superior Quality & Reliability
 - Greater Than 100,000 hr MTBF
- Data Time of Validity (TOV) Input & Output Synchronization



Suitable for Wide Variety of High-Precision Commercial, Industrial, Marine and Defense Applications

The TAC-440 MEMS-based Inertial Measurement Unit (IMU) is the world's smallest 1°/hour IMU and is a higher-performance, form, fit, and function compatible replacement for the Honeywell 1930 and 4930 IMUs. Featuring an ultra-compact package of less than 5 cubic inches, the TAC-440 delivers 1°/hour gyro bias with 1 mg accelerometer bias stability and very low 0.05°/√hour angle random walk (ARW) over wide temperature ranges. The breakthrough performance of the TAC-440 IMU is based on a EMCORE's proven quartz MEMS inertial sensor technology. EMCORE's quartz technology enables repeatable, high-volume production of precisely machined sensor structures combined with the inherent large signal output and thermal stability of quartz materials.



The TAC-440 is a compact IMU constructed with EMCORE's latest generation quartz gyros, quartz accelerometers, and high-speed signal processing to achieve outstanding precision performance. The TAC-440 IMU is designed for demanding, mission-critical, rugged environments. The solid-state quartz sensors and hermetically sealed IMU construction provide reliable MTBF. Continuous Built-in Test (BIT), configurable communications protocols, electromagnetic interference (EMI) protection make the TAC-440 IMU easy to use in a wide range of higher order integrated system applications.

The TAC-440 supports four data message synchronization methods with either input synchronization pulse capability or an output time of validity capability. The user can choose whether the synchronization pulse is internally generated and output as a Time of Validity (TOV) of the output data or whether the TAC-440 software will identify the synchronization pulse input and synchronize the output data to the input pulse.

Performance Highlights

Parameter	TAC-440
Gyro Performance	
Bias (Over Temperature) (1σ)	1.0°/hr
Bias In-Run Stability (1σ)	0.5°/hr
Angle Random Walk (ARW) (Max)	0.05°/√hr
Bandwidth (Min)	200 Hz
Accelerometer Performance	
Bias (Over Temperature)	1.0 mg
Bias In-Run Stability	100 μg
Velocity Random Walk	32 μg/√Hz

TAC-440

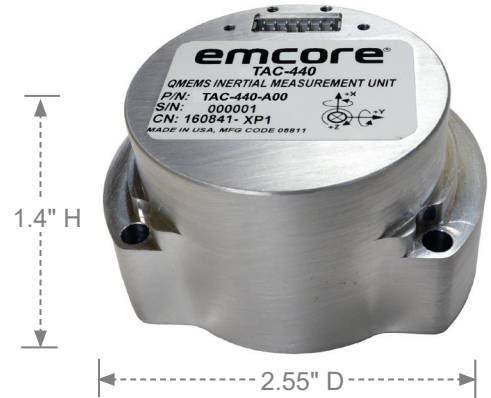
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Performance Specifications

Parameter	TAC-440
System Performance	
Start Up Time for Valid Data Output	1.0 secs max
Bandwidth, Phase (-90° Phase Shift) (Min)	200 Hz
Gyro Channels	
Bias (Over Temperature) (1 σ)	1.0°/hr
Bias In-Run Stability (1 σ)	0.5°/hr
Scale Factor Error (1 σ)	200 ppm
Angle Random Walk (ARW) (Max)	0.05 deg/ $\sqrt{\text{Hr}}$
Angular Rate – Dynamic Range (Min)	$\pm 1000^\circ/\text{sec}$, optional 10 to 10,000
Accelerometer Channels	
Bias (Over Temperature) (1 σ)	1.0 mg
Bias In-Run Stability (1 σ)	100 μg
Scale Factor Error (1 σ)	200 ppm
Velocity Random Walk (1 σ)	32 $\mu\text{g}/\sqrt{\text{Hz}}$
Acceleration - Calibrated Range (Min)	± 50 g standard, optional ± 70 or higher
Physical & Environmental	
Input Voltage	5 V
Power (Max)	5.0 watts
Input/Output (I/O)	Synchronous Data Link Control (SDLC) UART configurable: RS-422 digital differential serial interface
Data Synchronization Pulse	I/O: 1 Hz, 100 Hz, 200 Hz, 400 Hz, 600 Hz, and 1200 Hz (selectable) Output: 2400 Hz
Dimensions (height x diameter)	1.4" H x 2.0" D (maximum diameter 2.55 inch)
Volume	<5 cu in
Weight	0.5 lbs
Temperature (Operating/Storage)	-55°C to +85°C / -55°C to +85°C
Vibration (Operating)	15 g, rms
Shock (Operating)	50 g, 11 ms half-sine, each axis
Operating Life/Dormancy	20 yrs
Reliability (MTBF)	100,000 hrs ground benign

Dimensions/Scale



Notes

Specifications are based on 100 Hz Inertial Data ($\Delta V/\Delta \theta$)

EMCORE P/N 1000027890 Rev XP1

For More Information

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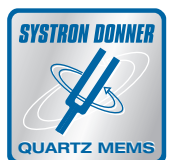
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MADE IN
USA

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