**Attitude and Heading Reference System**

**AHRS-E304**

**Description:**
The signals from three solid state angular rate sensors are coordinate transformed and then integrated to produce attitude and heading outputs that reflect normal aircraft attitude coordinates. Attitude and heading signals are compared against a triaxial accelerometer and a triaxial fluxgate magnetometer to derive gyro drift error. These errors are filtered over a long time constant and are used to adjust biases in the system so that the long-term convergence of the system is to the vertical references and the magnetic heading. A velocity input is used to calculate compensations for centrifugal forces and velocity changes on the vertical reference to improve overall stability and accuracy.

This is a microprocessor-based system using a 16 bit A/D converter, a 12 bit D/A converter and an RS-232 interface. The microprocessor has stored parameters for all the sensor inputs to correct bias, scale factor, axis alignment, and others. The analog attitude and heading outputs are updated 71.11 times per second. The serial interface is highly configurable and provides access to almost all operational parameters.

**Applications:**
The AHRS-E304 is useful for land, sea and airborne applications. It can be used to drive an attitude indicator flight display, for control and stabilization of remote piloted subs or aerial vehicles, and for robotics research and road surface measurement.

- Solid State, Strapdown System
- Low Cost, Low Power
- Rugged, High Reliability
- Vibration Resistant
- Analog and RS-232 Serial Outputs
- PC Heading Calibration
- Two Year Limited Warranty
- Engineering Support

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### AHRS-E304 Specifications

**Attitude**
- **Range:** Bank\(\pm 180^\circ\)
- **Range:** Elevation\(\pm 90^\circ\)
- **Resolution:** 0.02°
- **Analog Scale Factor:** 18°/V\(\pm 10V\) Bank\(\pm 5V\) Elevation
- **Accuracy:** Static\(\pm 0.25^\circ\)
- **Accuracy:** Dynamic 0.5%

**Magnetic Heading**
- **Range:** 0° - 360°
- **Resolution:** 0.02°
- **Analog Scale Factor:** 18°/V\(\pm 10V\) Output
- **Accuracy:** Static\(\pm 1^\circ\)
- **Accuracy:** Dynamic 0.5%

**Angular Rate**
- **Range:** Roll, Pitch, Yaw\(\pm 100^\circ/\text{sec}\)
- **Resolution:** 0.025°/sec
- **Analog Scale Factor:** 10°/sec/V\(\pm 10V\) Output
- **Scale Factor Accuracy:** 0.5%
- **Bias:** Roll, Pitch, Yaw\(< 0.2°/\text{sec (Analog)}\)
- **Non-Linearity:** < 0.1%
- **Bandwidth:** 20 Hz
- **Noise:** < 0.03°/sec rms

**Acceleration**
- **Range:** X, Y, Z\(\pm 10g\)
- **Resolution:** 4mg
- **Scale Factor Accuracy:** 1%
- **Bias:** X, Y, Z\(< 10mg\)
- **Non-Linearity:** 0.1%
- **Bandwidth:** 3 Hz

**Magnetic**
- **Range:** X, Y, Z\(\pm 1000 \text{ mGauss}\)
- **Resolution:** 0.1 mGauss
- **Scale Factor Accuracy:** 1%
- **Bias:** X, Y, Z\(< 5 \text{ mGauss}\)
- **Non-Linearity:** < 0.01%
- **Bandwidth:** 10 Hz

**Environmental**
- **Temperature:** Operating -40°C to +85°C
- **Temperature:** Storage -55°C to +85°C
- **Vibration:** Operating 5g rms
- **Vibration:** Survival 10g rms
- **Shock:** Survival 500g
- **Bandwidth:** 10mS \(1/2\) sine wave

**Electrical**
- **Frame Rate:** 71.1 Hz
- **Startup Time:** Data 5 sec
- **Startup Time:** Fully operational 10 sec
- **Input Power:** 10 to 35VDC 4.0W
- **Input Current:** 310mA @ 12VDC 165mA @ 24VDC
- **Input Velocity:** (Optional)\(\pm 10\text{VDC}\) Full scale \(\pm 800\text{kp}\)
- **Digital Output:** RS-232
- **Analog Output:**\(\pm 10\text{VDC}\)
- **Analog Output Impedance:** 300 Ohm

**Physical**
- **Axis Alignment:** < 0.1°
- **Size:** Including Mounting Flanges 3.24"W x 5.78"L x 4.68"H
- **Weight:** 35 oz (2.2lb)
- **Connection:** RS-232 / Analog Outputs 25 pin male "D" subminiature
- **Connection:** Power 4 pin male MS-3110-P8-4P

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* Assumes accurate velocity data.
† Static heading accuracy is dependent on the magnetic environment.
- Specifications are subject to change without notice.
- This product may be subject to export restrictions. Please consult the factory.