Solid State Angular Rate Sensor

ARS-C122-1A ARS-C142-1A
ARS-C132-1A ARS-C152-1A

Description:

This solid-state angular rate sensor has a sensing mechanism consisting of piezoelectric bender elements in a "tuning fork" configuration. The drive elements are resonantly driven in opposite directions. When a rotation occurs, the momentum stored in the vibrating elements causes an out-of-plane bending force (called Coriolis force) that is demodulated to accurately represent the rotation rate.

These angular rate sensors have no moving parts, no detectable hysteresis, quick startup, and are low cost since the sensors are electronic rather than mechanical. The preferred configuration made by Watson Industries is a piezoelectric assembly that senses angular rates about its long axis. There is no significant hysteresis or threshold in the Angular Rate Sensor since there is no rotating mass or friction. Resolution is system noise limited to 15mV RMS maximum at 50 Hz bandwidth. The effects of external noise on the sensor are minimized with the unique "tuning fork" design that responds to rotational motion and rejects linear motion associated with vibration.

Since vibration normally contains angular motion as well as linear motion, care should be taken when mounting the sensor to keep this rotational signal isolated (a 0.01° rotation in 0.01 seconds is equivalent to 1°/second). The absence of moving parts contributes to the unit's durability and long life.

Multiple axis, remote sensor, custom power and special performance specification versions of this sensor are also available.

- All Solid State
- Low Cost
- Low Power
- Light Weight
- EMI Protection
- High Reliability
- One Year Warranty
- Engineering Support

Applications:

Watson angular rate sensors have traveled in space, visited the Titanic, and have been used by every U.S. car company. Watson Industries, Inc. has sold tens of thousands sensors all over the world.

These sensors are used for instrumentation and control for robotics, head and limb motion testing, virtual reality, ship stabilization, automotive testing, and remotely piloted vehicles.

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ARS Specifications

Angular Rate

Range:	±100°/sec	Up to ±500°/sec available
Resolution:	0.1°/sec	
Analog Scale Factor:	10°/sec/V (Typical)	See table below
Scale Factor Accuracy:	1%	Constant temperature
Scale Factor Temp Coefficient:	3%	Over temperature range
Bias:	< 0.5°/sec (Typical)	See table below
Bias: Over Temp Range	±5°/sec (Typical)	See table below
Warmup Drift:	±1°/sec (Typical)	See table below
Non-Linearity:	< 0.05%	Full scale range
Bandwidth:	50 Hz	
Noise:	< 0.05°/sec rms (Typical)	See table below

Environmental

Temperature: Operating	-20°C to +50°C	-40°C to +85°C w/ reduced spec
Temperature: Storage	-55°C to +85°C	
Vibration: Operating	2.5g rms	20 Hz to 2 KHz
Vibration: Survival	10g rms	20 Hz to 2 KHz
Shock: Survival	500g	10mS ½ sine wave

Electrical

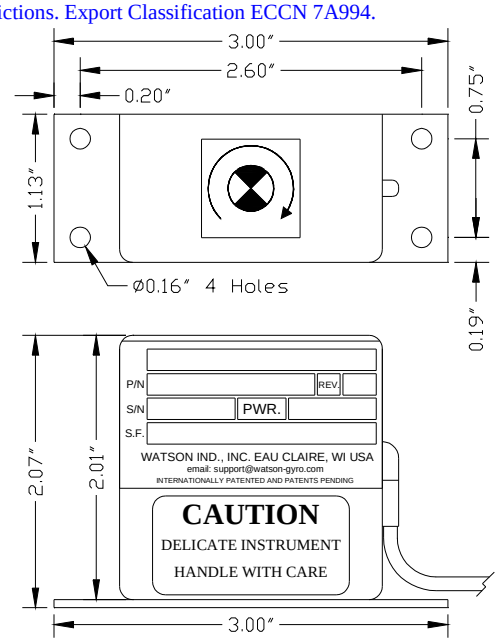
Input Power: Positive	12 to 16VDC	0.2W
Input Power: Negative	-12 to -16VDC	0.2W
Input Current:	10mA @ ±15VDC	
Analog Output:	±10VDC	
Analog Output Impedance:	1000 Ohm	

Physical

Size: Including Mounting Flanges	1.13"W x 3.00"L x 2.07"H	2.9 x 7.6 x 5.3 (cm)
Weight:	2 oz	57 grams
Connection:	Wire Bundle	
Life:	> 50,000 Hrs MTBF	

- Specifications are subject to change without notice.
- This product may be subject to export restrictions. Export Classification ECCN 7A994.

Dimensions:



Watson Industries ARS Models*

Model	Range	Scale Factor	Bias	Bias Over Temperature	Warmup Drift	Noise
ARS-C122-1A	±30°/sec	3°/sec/V	< 0.5°/sec	±5°/sec	1°/sec	< 0.05°/sec rms
ARS-C132-1A	±100°/sec	10°/sec/V	< 0.5°/sec	±5°/sec	1°/sec	< 0.05°/sec rms
ARS-C142-1A	±300°/sec	30°/sec/V	< 4°/sec	±10°/sec	6°/sec	< 0.06°/sec rms
ARS-C152-1A	±400°/sec	40°/sec/V	< 8°/sec	±20°/sec	12°/sec	< 0.1°/sec rms

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