



# Dual Axis Vertical Reference System

**VRS-E232-1AD**

## **Description:**

The Watson Industries Dual Axis Vertical Reference System is a solid-state gyro package used to measure angular displacement and rate, especially where dynamic motion may interfere. Under these conditions, the effects of lateral accelerations severely limit the performance of an ordinary accelerometer or pendulous device.

The Watson Dual Axis Vertical Reference achieves improved performance by integrating the output of a vibrating structure gyro to get an estimate of the attitude, which is then compared to the output of conventional accelerometers to find the error. This error is then filtered over a long time constant and subtracted from the rate gyro output to correct biases as a closed loop error correction system. This system lets the gyro dominate the attitude accuracy above the correction loop frequency while the accelerometer reference dominates the lower frequencies.

The VRS can be a functional replacement for mechanical gyros, which are often more expensive and less reliable than this solid-state sensor.

The VRS is especially suited for applications where there is limited bank and elevation such as ships, underwater vehicles, some land vehicles, and certain camera applications. This is because the VRS uses a linear coordinate system.



- Solid State, Strap Down System
- High Accuracy
- Low Cost, Low Power
- Rugged, High Reliability
- Analog and RS-232 Digital Outputs
- Two Year Limited Warranty
- Engineering Support

## **Applications:**

The VRS is used to stabilize and control ships and submersibles, to stabilize antenna platforms, to instrument automobiles, and for many other applications.



## **Watson Industries, Inc.**

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## VRS-E232-1AD Specifications

### Attitude

Range: Bank, Elevation	±75° (±30°)	Digital (Analog)
Resolution:	0.02°	Binary mode (14 bit)
Analog Scale Factor:	3°/V	±10V Output
Accuracy: Static	±0.3°	
* Accuracy: Dynamic	2%	

### Angular Rate

Range: Roll, Pitch	±100°/sec	
Resolution:	0.01°/sec	Binary mode (14 bit)
Analog Scale Factor:	10°/sec/V	±10V Output
Scale Factor Accuracy:	1%	
Bias: Roll, Pitch	< 0.1° (Analog)	±0.02°/sec Binary mode (14 bit)
Non-Linearity:	< 0.03%	Full scale range
Bandwidth:	20 Hz	
Noise:	< 0.02°/sec rms	

### Acceleration

Range: X, Y, Z	±10g	
Resolution:	4mg	
Analog Scale Factor:	1g/V	±10V Output
Scale Factor Accuracy:	1%	
Bias: X, Y, Z	< ±5mg	
Non-Linearity:	< 1%	Full scale range
Bandwidth:	20 Hz	

### Environmental

Temperature: Operating	-30°C to +60°C	
Temperature: Storage	-55°C to +85°C	
Vibration: Operating	5g rms	20 Hz to 2 kHz
Vibration: Survival	10g rms	20 Hz to 2 kHz
Shock: Survival	500g	10ms ½ sine wave

### Electrical

Frame Rate	71.1 Hz	Maximum
Startup Time: Data	5 sec	
Startup Time: Fully operational	10 sec	
Input Power:	10 to 30VDC	3.2W
Input Current:	270mA @ 12VDC	135mA @ 24VDC
Digital Output	RS-232	
Analog Output	±10VDC	
Analog Output Impedance:	300 Ohm	Per line

### Physical

Axis Alignment:	< 0.25°	
Size: Including Mounting Flanges	3.24"W x 5.78"L x 4.18"H	8.2 x 14.7 x 10.6 (cm)
Weight:	30oz (1.9lb)	850g (0.85kg)
Connection: RS-232 / Analog Outputs	9 pin female "D" subminiature	
Connection: Power	9 pin male "D" subminiature	

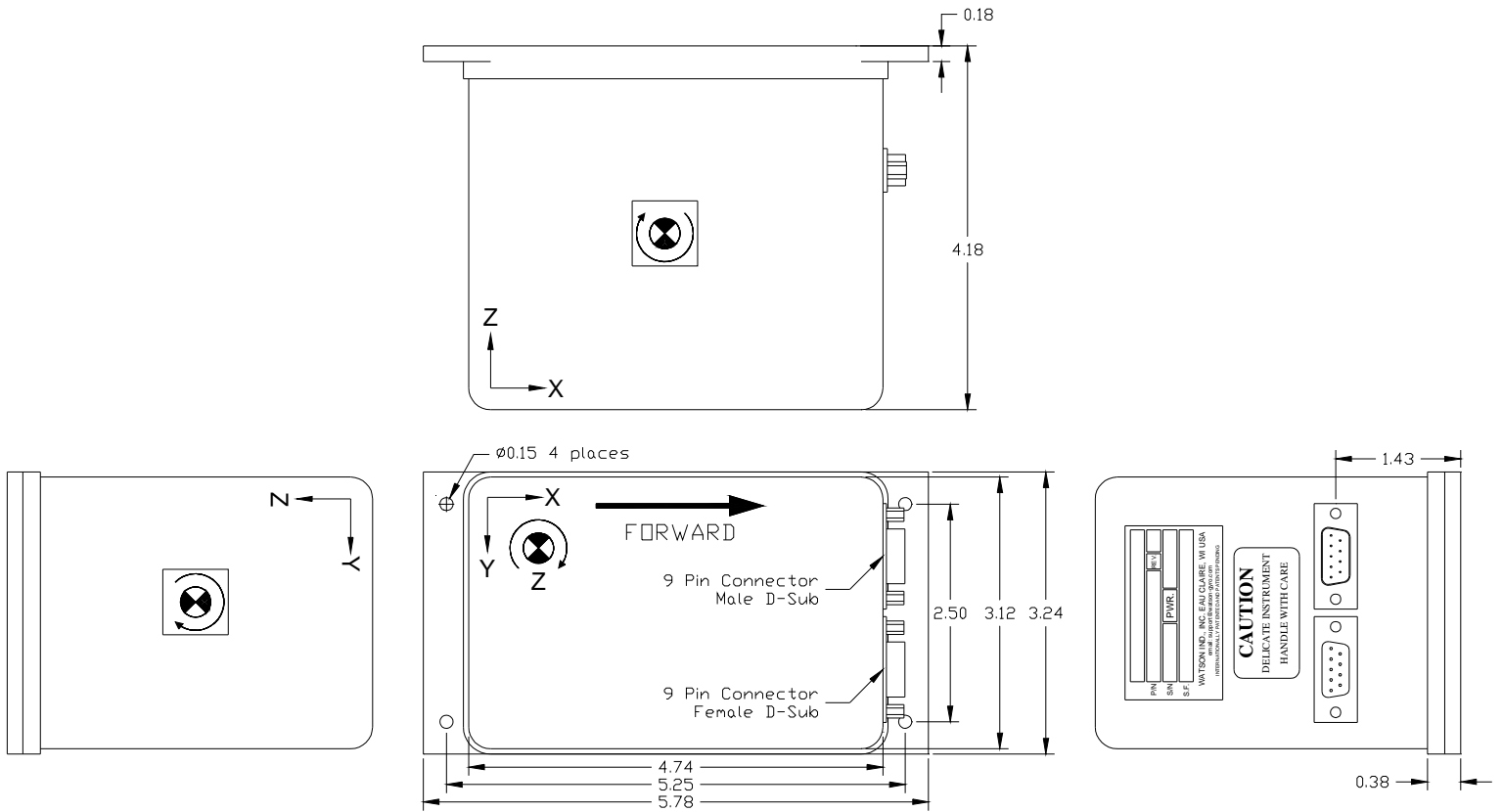
- \* Actual accuracy can be calculated as the listed percentage multiplied by the change in value over the entire dynamic maneuver.
- Specifications are subject to change without notice.
- This product may be subject to export restrictions. Please consult the factory.



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**Dimensions:**



07/10 DAO



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