



Vibrating Structure Gyroscope Bipolar Version

Owner's Manual

1. Description

The Vibrating Structure Gyroscope (VSG) is a solid state, single-axis, angular rate sensor. The VSG provides a voltage proportional to the rate of turn about its sensitive axis and requires only DC power for operation.

The sensitive axis is perpendicular to the base of the instrument. Angular rotation about this axis is sensed by a vibrating ceramic cylinder. Coriolis forces acting upon the cylinder result in a DC output proportional to the rate of rotation.

2. Characteristics

2.1 Electrical

The input range, sensitivity, and resolution for different versions of the VSG are given in Table 1.

Part Number	Rate Input Range %/s	Nominal Scale Factor		Resolution %/s	Voltage Range for Full Scale Rate
		mV/%s	%s/V		
VSG-E469	±50	100	10	0.013	±5 V
VSG-E470	±100	50	20	0.025	
VSG-E601	±200	25	40	0.05	
VSG-E470-500	±500	10	100	0.13	
VSG-E470-1000	±1000	5	200	0.25	
Additional scale factors available on request.					

Table 1

The VSG power requirements are given in Table 2.

Supply Voltages	+8.5 V to +16 V (wrt Pwr. Gnd.)
Current	<= 80 mA
Noise and Ripple	DC to 1 kHz: 50 mV pk-pk (max)

Table 2

The wiring call-out is given in Figure 1.

Notes: The output voltage (blue wire) is relative to the signal ground (green wire).

The external reference output (orange wire) is for referencing to a digital circuit with a maximum load of 1 mA.

The temperature sensor output (yellow wire) gives an output voltage relative to the power ground (black wire).

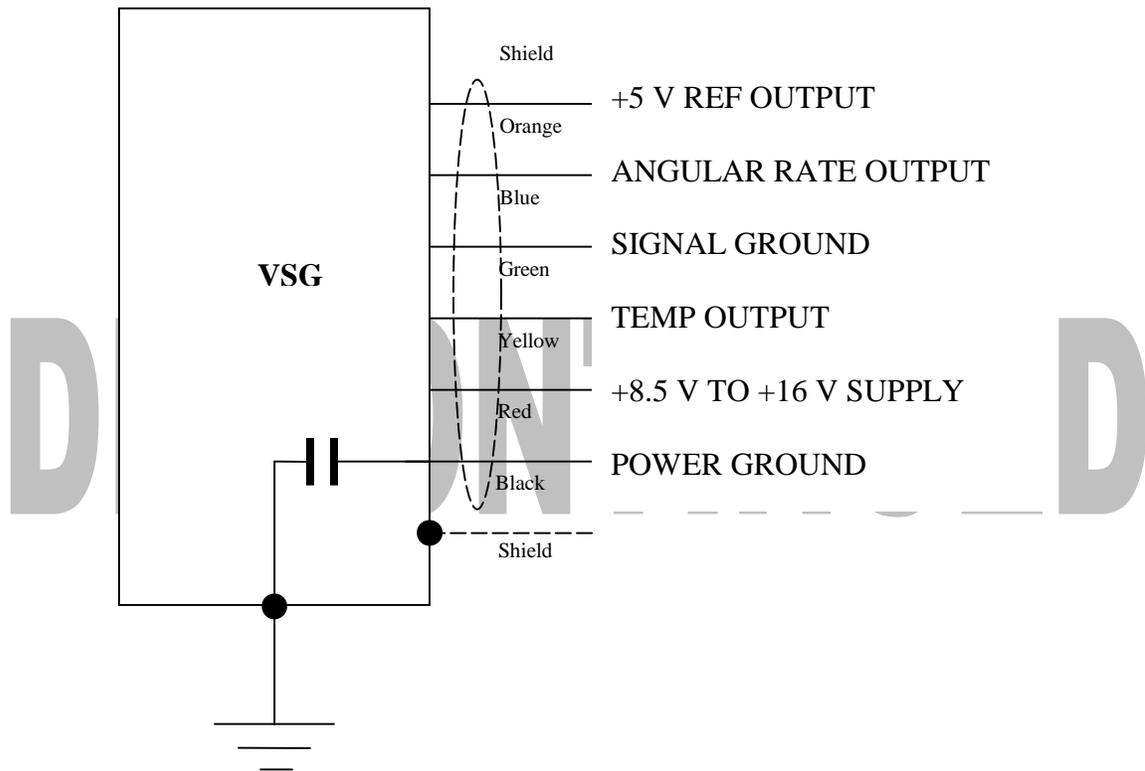


Figure 1: Electrical Interface

Load Impedances:

- Rate Output: > 100 kΩ
- Temperature Output: 14 MΩ
- +5 V Ref Output: > 5 kΩ

Temperature Voltage Output

The VSG provides a temperature-dependent output voltage on the yellow wire. This temperature signal is referenced to the black wire (power ground).

The voltage is proportional to the absolute temperature, and has a scale factor of approximately 2.1 mV/°C.

$$\text{Output Voltage (mV)} = 2.1 * (T + 273) \text{ where } T = \text{temperature in } ^\circ\text{C}.$$

e.g. @ 25°C: $2.1 * (25 + 273) = 626 \text{ mV}$

2.2 Physical

The physical dimensions of the unit are shown in Figure 2. A three-point mounting is provided on the case of the unit. The gyro should be attached by three screws through the 3.5 mm (0.138") holes in the mounting feet. To avoid distortion, the gyro must be attached to a clean, flat surface, and the fasteners must be tightened evenly to 0.5 Nm (0.7 ft.lb.) torque.

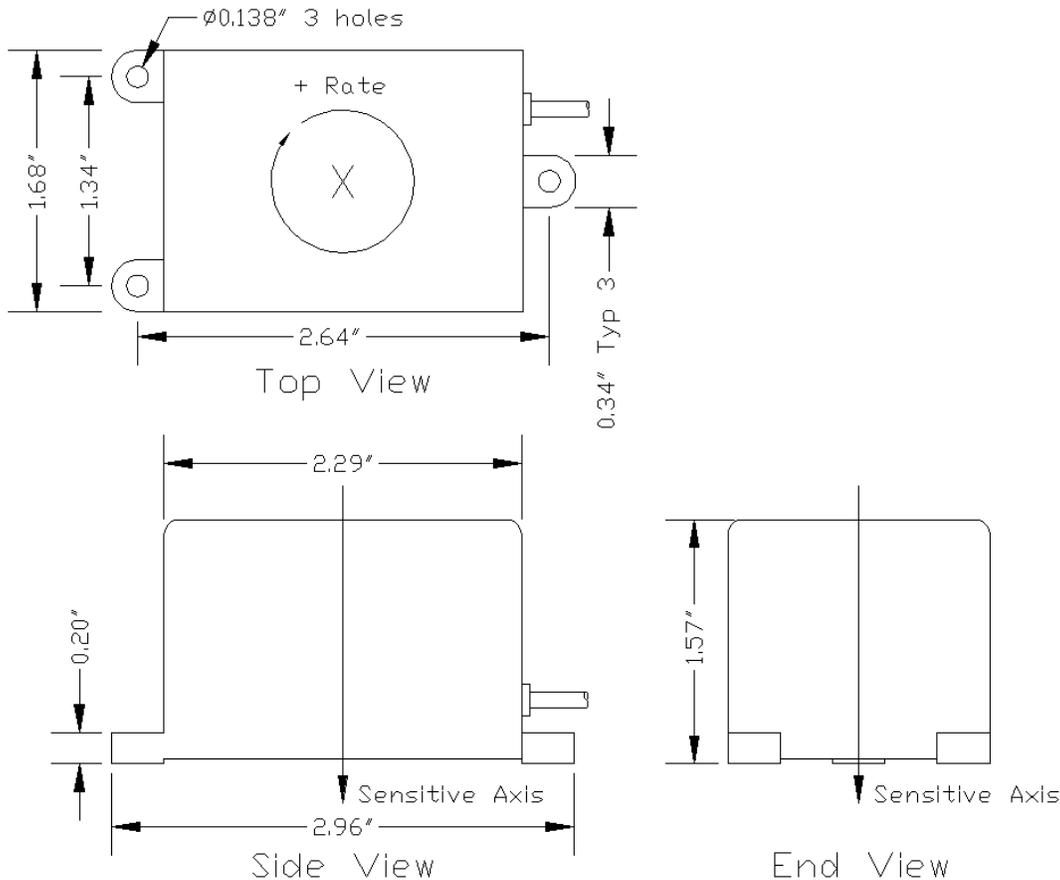


Figure 2: VSG Dimensions

2.3 Environmental

The environmental specifications are given in Table 3.

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

Table 3

3. Constraints

The VSG case is coupled to power ground via a 100 nF capacitor. Do not apply more than 30 V between the case of the VSG and power ground.

The wire bundle is shielded and connected to the VSG case. Watson Industries recommends that you do not connect to the shield.

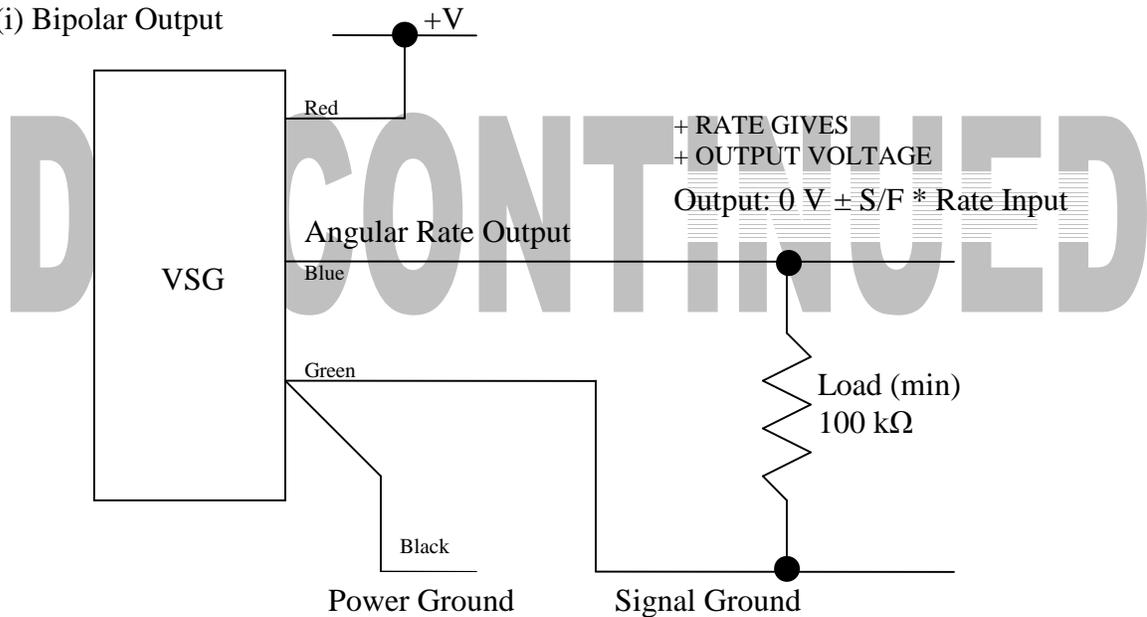
The case of the VSG is not hermetically sealed. Avoid the possibility of moisture entering the case.

The power ground is already connected internally to the signal ground. Do not connect the ground wires externally.

The VSG, although of rugged design, is a sensitive instrument. Take care when handling it.

4. Typical Operating Circuits

(i) Bipolar Output



(ii) Digital Output

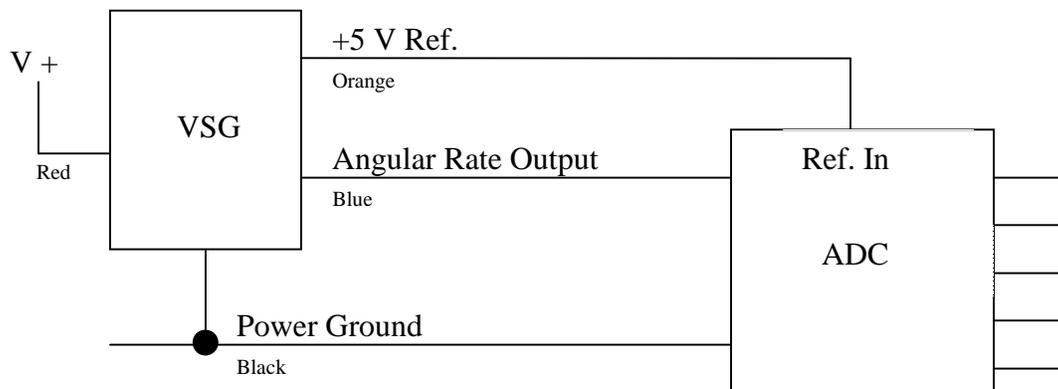


Figure 3: Typical Configurations

Warning

Rough handling, dropping, or miswiring this unit is likely to cause damage.

DISCLAIMER

The information contained in this manual is believed to be accurate and reliable; however, it is the user's responsibility to test and to determine whether a Watson Industries' product is suitable for a particular use.

Suggestion of uses should not be taken as inducements to infringe upon any patents.

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Excluded from any warranty given by Watson Industries are products that have been subject to abuse, misuse, damage or accident; that have been connected, installed or adjusted contrary to the instructions furnished by seller; or that have been repaired by persons not authorized by Watson Industries.

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No agent or representative of Watson Industries is authorized to assume, and Watson Industries will not be bound by any other obligation or representation made in connection with the sale and/or purchase of this product.

PRODUCT LIFE

The maximum expected life of this product is 20 years from the date of purchase. Watson Industries, Inc. recommends the replacement of any product that has exceeded the product life expectation.

SERVICE

Watson Industries, Inc. has no service outlets. All service is performed at the factory. In order to insure prompt service, prior to returning units for repair please call, write or fax:

Watson Industries, Inc.
3041 Melby Road
Eau Claire, WI 54703
ATTN: Service Department
Telephone: (715) 839-0628
Fax: (715) 839-8248
Email: support@watson-gyro.com
Internet: www.watson-gyro.com

All sensors returned under warranty will be repaired (or replaced at the sole option of Watson Industries) at no cost to the customer other than shipping charge from customer to Watson Industries (plus any export and transportation charges outside the United States).

In the case of units not under warranty, a flat repair fee will be charged. This fee can be determined by contacting Watson Industries. Modified units or those subjected to extreme abuse may be returned to the customer unrepaired.