

BAE SYSTEMS

**VIBRATING STRUCTURE GYROSCOPE
USER GUIDE
Unipolar Version (29965x-0100)**

Document no: 299650-0720, Issue 5

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 supplies 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 variants of the VSG are given in Table 1.

BAE SYSTEMS

**VIBRATING STRUCTURE GYROSCOPE
USER GUIDE
Unipolar Version (29965x-0100)**

Document no: 299650-0720, Issue 5

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 supplies 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 variants of the VSG are given in Table 1.

Part Number	Rate Input Range %/s	Nominal Scale Factor mV/%s	Resolution %/s	Voltage Range for Full Scale Rate
299650-0100	±50	40	0.013	+4.5V to +0.5V
299651-0100	±100	20	0.025	
299652-0100	±200	10	0.05	
299653-0100	±500	4	0.125	
299654-0100	±1000	2	0.25	
Note: Zero rate gives +2.5 V				

Table 1

The VSG power requirements are given in Table 2.

Supply voltages	+8.5 V to +18 V (wrt 0 V)
Current	+ve rail ≤ 130 mA
Noise and ripple	dc to 1 kHz: 50 mV pk-pk (max)

Table2

The wiring schedule is given in Figure 1.

Notes: The output voltage (blue lead) is relative to the +2.5 V reference voltage (green lead).

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

For further information contact: Marianne Daly

BAE SYSTEMS

Clifford Road, Southway, Plymouth, Devon, PL6 6DE, England

Tel: 01752 723020, Fax: 01752 722095

e.mail: marianne.daly@baesystems.com

Part Number	Rate Input Range %/s	Nominal Scale Factor mV/%s	Resolution %/s	Voltage Range for Full Scale Rate
299650-0100	±50	40	0.013	+4.5V to +0.5V
299651-0100	±100	20	0.025	
299652-0100	±200	10	0.05	
299653-0100	±500	4	0.125	
299654-0100	±1000	2	0.25	
Note: Zero rate gives +2.5 V				

Table 1

The VSG power requirements are given in Table 2.

Supply voltages	+8.5 V to +18 V (wrt 0 V)
Current	+ve rail ≤ 130 mA
Noise and ripple	dc to 1 kHz: 50 mV pk-pk (max)

Table2

The wiring schedule is given in Figure 1.

Notes: The output voltage (blue lead) is relative to the +2.5 V reference voltage (green lead).

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

For further information contact: Marianne Daly

BAE SYSTEMS

Clifford Road, Southway, Plymouth, Devon, PL6 6DE, England

Tel: 01752 723020, Fax: 01752 722095

e.mail: marianne.daly@baesystems.com

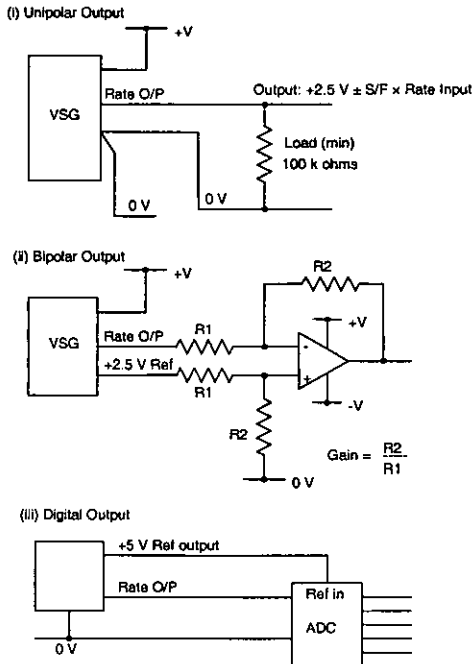
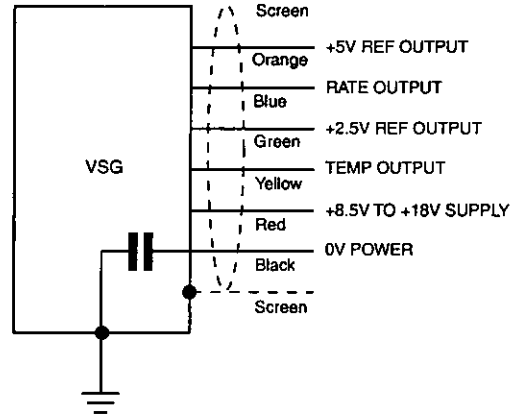


Figure 3 Typical Configurations

The temperature sensor output (yellow lead) gives an output voltage relative to the 0 V supply (black lead).



Load Impedances:

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

C.G. 17176

Figure 1 Electrical Interface

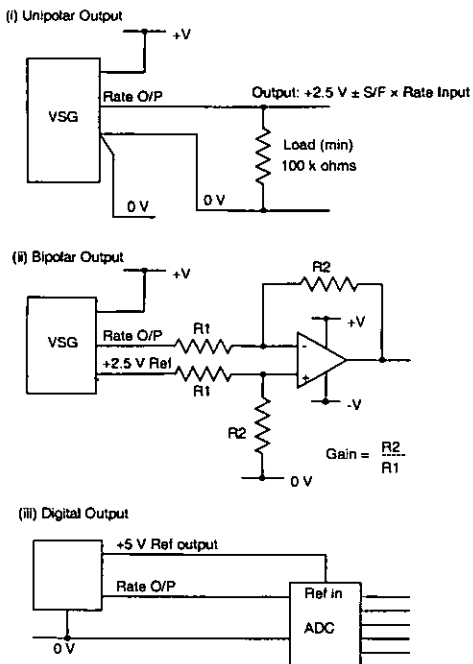
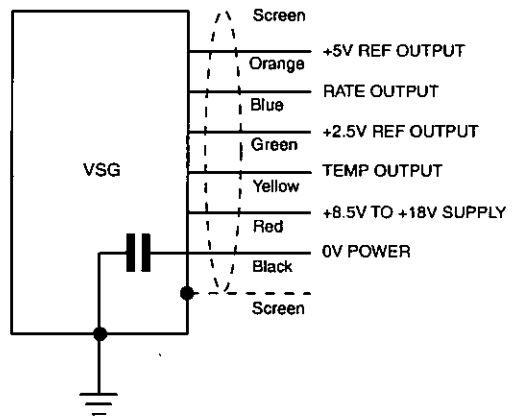


Figure 3 Typical Configurations

The temperature sensor output (yellow lead) gives an output voltage relative to the 0 V supply (black lead).



Load Impedances:

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

C.G. 17176

Figure 1 Electrical Interface

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 holes in the mounting feet. To avoid distortion the unit must be attached to a clean, flat surface and the fixings must be tightened evenly (tightening torque not to exceed 0.5 Nm).

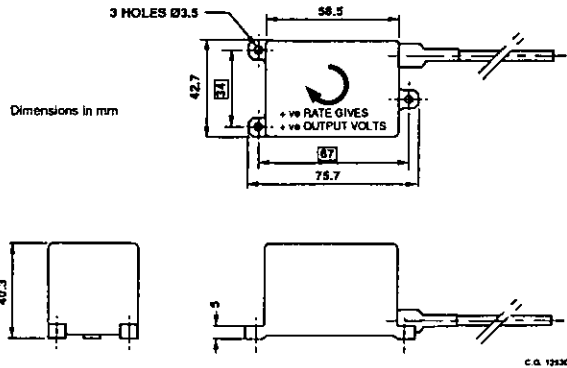


Figure 2 VSG Space Envelope

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 holes in the mounting feet. To avoid distortion the unit must be attached to a clean, flat surface and the fixings must be tightened evenly (tightening torque not to exceed 0.5 Nm).

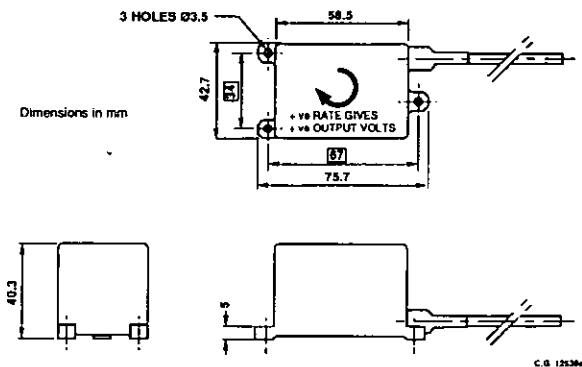


Figure 2 VSG Space Envelope

2.3 Handling

The handling specifications are given in Table 3.

Operating temperature range	-30 °C to +60 °C (full performance spec)
Survival temperature range	-40 °C to +85 °C (restricted performance spec)
Shock survival	1000 g, 3 ms, ½ sine wave
Vibration survival	10 g rms 20 – 2000 Hz

Table 3

3 Constraints

The VSG case is coupled to 0 V via a 100 nF capacitor. Do not apply more than 30 V between the case of the VSG and 0 V.

The flying lead is screened and connected to the VSG case. BAE SYSTEMS recommends that you do not connect to the screen.

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

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

4 Safety

Harmful fumes may be produced if the unit is subjected to excessive temperatures, such as those experienced in fire conditions.

2.3 Handling

The handling specifications are given in Table 3.

Operating temperature range	-30 °C to +60 °C (full performance spec)
Survival temperature range	-40 °C to +85 °C (restricted performance spec)
Shock survival	1000 g, 3 ms, ½ sine wave
Vibration survival	10 g rms 20 – 2000 Hz

Table 3

3 Constraints

The VSG case is coupled to 0 V via a 100 nF capacitor. Do not apply more than 30 V between the case of the VSG and 0 V.

The flying lead is screened and connected to the VSG case. BAE SYSTEMS recommends that you do not connect to the screen.

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

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

4 Safety

Harmful fumes may be produced if the unit is subjected to excessive temperatures, such as those experienced in fire conditions.