SB-EN3

FIS GAS SENSOR SB-EN3

for MOUTH ODOUR LEVEL MONITORING

The SB-EN3 is a tin dioxide semiconductor gas sensor which was specially developed for mouth odour level monitoring. This sensor has a high sensitivity to sulphur compounds and hydrocarbons which can be produced in the mouth depending on the conditions of mouth and/or human body.

Structure

Gas sensitive semiconductor material is a mini bead type and a heater coil and electrode wire are embedded in the element. The sensing element is installed in the metal housing which uses double stainless steel mesh (100 mesh) in the path of gas flow. The mesh is an anti-explosion feature (Fig 1).

Operating conditions

Fig 2 shows the standard operating circuit for this model. The change of the sensor resistance (R_S) is obtained as the change of the output voltage across the fixed or variable resistor (R_L). In order to obtain the best performance and specified characteristics, the values of the heater voltage (V_H) circuit voltage (V_C) and load resistance (R_L) must be within the range of values given in the standard operating conditions shown in the Specification table on the next page.

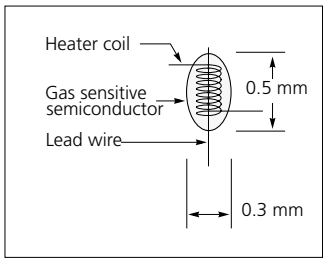


Fig 1a. Sensing element

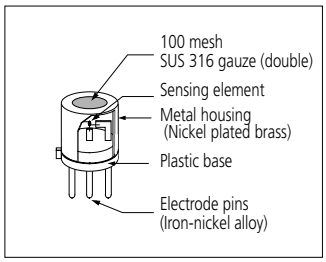


Fig 1b. Configuration

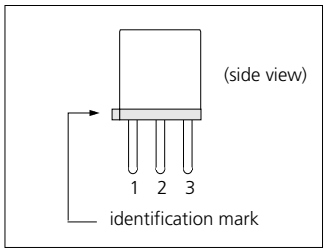


Fig 1c. Pin Layout

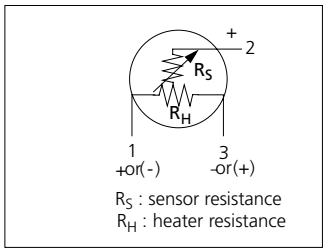
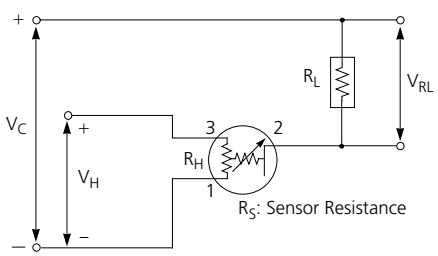


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-EN3 (typical data). Sensitivity characteristics of the FIS gas sensors are expressed by the relationship between the gas concentration and sensor signal. The sensor signal decreases with an increase of gas concentration based on a logarithmic function.

The sensitivity characteristics of the SB-EN3 is specified by the following parameters.



V_C : Circuit Voltage
V_H : Heater Voltage
R_L : Load Resistance
R_H : Heater Resistance
V_{RL}: Voltage across load resistance

Operating conditions:
V_C : 5 V DC
V_H : 1.0 V DC (5 secs) - 0.3 V for detection
R_L : Variable (> 200 Ω)

Fig 2. Standard circuit

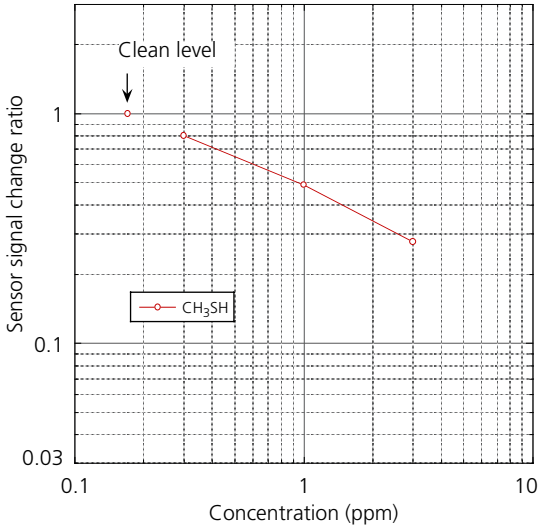


Fig 3. Sensitivity characteristics

Specifications

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
V_H	Heater voltage	1.0 V ± 0.05V for 5 seconds (warm up) 0.3V ± 0.02V (for detection)	AC, DC or pulse
V_C	Circuit voltage	Less than 5 V	DC: Pin3 (+) - Pin 1 (-)
R_L	Load resistance	Variable (> 200 Ω)	P_S < 10 mW
R_H	Heater resistance	2.8 Ω ± 0.2 Ω	at room temperature
I_H	Heater current	140 mA (max)	$I_H = V_H / R_H$ (typical value)
P_H	Heater power consumption	140 mW (max)	$P_H = V_H^2 / R_H$ (typical value)
P_S	Power dissipation of sensing element	Less than 10 mW	$P_S = \frac{(V_C - V_{RL})^2}{R_S}$

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
Tao	Operating temperature	-0 °C to 40 °C	Recommended range
Tas	Storage temp	-10 °C to 70 °C	
RH	Relative humidity	Less than 95% RH	
(O_2)	Oxygen concentration	21% ± 1% (Standard condition)	Absolute minimum level: more than 18%
		The sensitivity characteristics are influenced by the variation in oxygen concentration.	

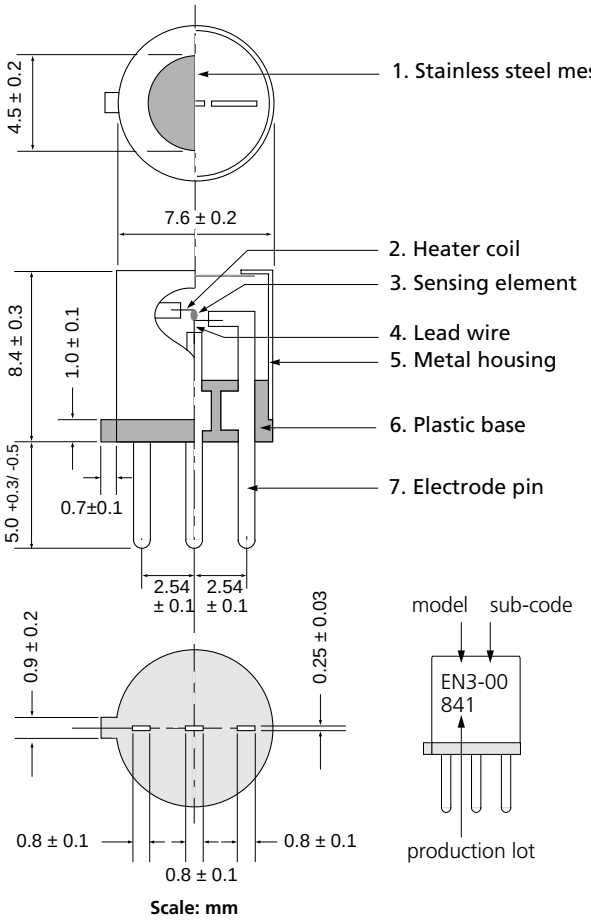
C. Sensitivity characteristics

Model	SB-EN3-00 (tentative specifications)		
Symbol	Parameter	Specification	Conditions etc.
S/So	Sensitivity (gas/air)	≤ 0.60	$\frac{\text{Signal at 1 ppm of } CH_3SH}{\text{Signal in clean air}}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air)	V_C: 5.0 V ± 1% V_H: 1.0 V ± 1% x 5 secs 0.3V± 1% R_L : 10 kΩ ± 5%
		Pre-heating time: more than 48 hours	

D. Mechanical characteristics

Items	Conditions		Specifications
Vibration	Frequency: Vertical amplitude: Duration:	100 cpm 4 mm 1 hour	Should satisfy the specifications shown in the sensitivity characteristics.
Shock	Acceleration: Number of impacts:	100 G 5 times	

Dimensions



Scale: mm

E. Parts and Materials

No.	Parts	Materials
1	Sensing element	Tin dioxide (SnO_2)
2	Lead wire	Platinum
3	Heater coil	Platinum
4	Plastic base	PBT (Poly butylene terephthalate)
5	Stainless steel mesh	SUS 316 (100 mesh, double)
6	Metal housing	Nickel plated brass
7	Electrode pins	Iron-nickel alloy

Please contact

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