

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.

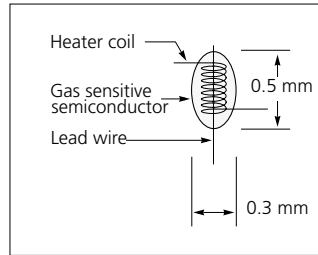


Fig 1a. Sensing element

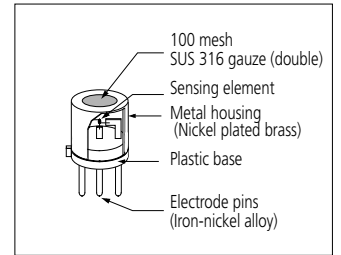


Fig 1b. Configuration

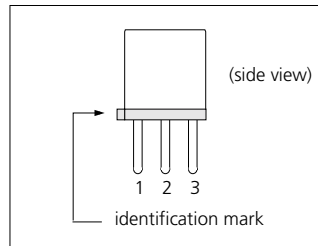


Fig 1c. Pin Layout

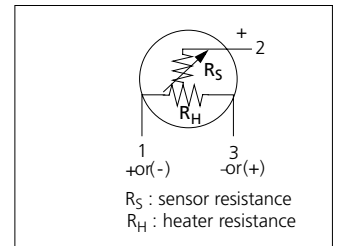


Fig 1d. Equivalent circuit

(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.

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.

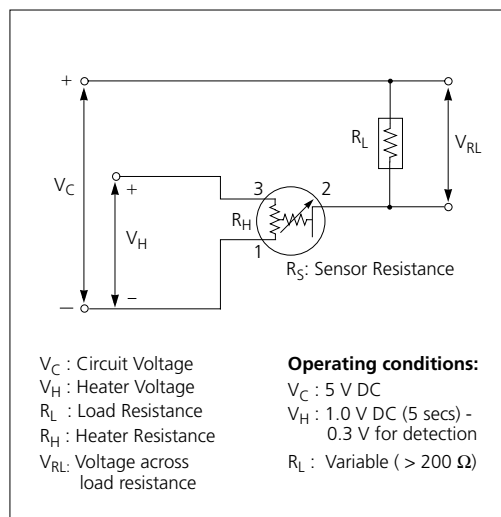


Fig 2. Standard circuit

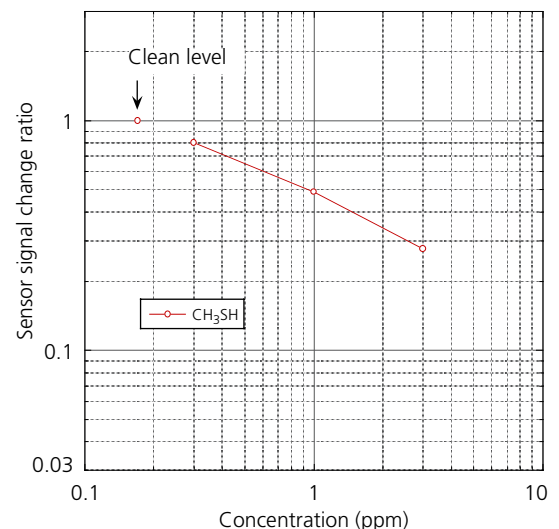


Fig 3. Sensitivity characteristics

SPECIFICATIONS

SB-EN3

Specifications

A. Standard Operating conditions

| Symbol | Parameter | Specification | Conditions etc. |
|--------|--------------------------------------|---|--------------------------------------|
| V_H | Heater voltage | 1.0 V \pm 0.05V for 5 seconds (warm up) 0.3V \pm 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 $\Omega \pm 0.2 \Omega$ | 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. |
|-------------------|-----------------------|---|---------------------------------------|
| T_{ao} | Operating temperature | -0°C to 40 °C | Recommended range |
| T_{as} | Storage temp | -10 °C to 70 °C | |
| RH | Relative humidity | Less than 95% RH | |
| (O ₂) | Oxygen concentration | 21% \pm 1% (Standard condition) The sensitivity characteristics are influenced by the variation in oxygen concentration. | Absolute minimum level: more than 18% |

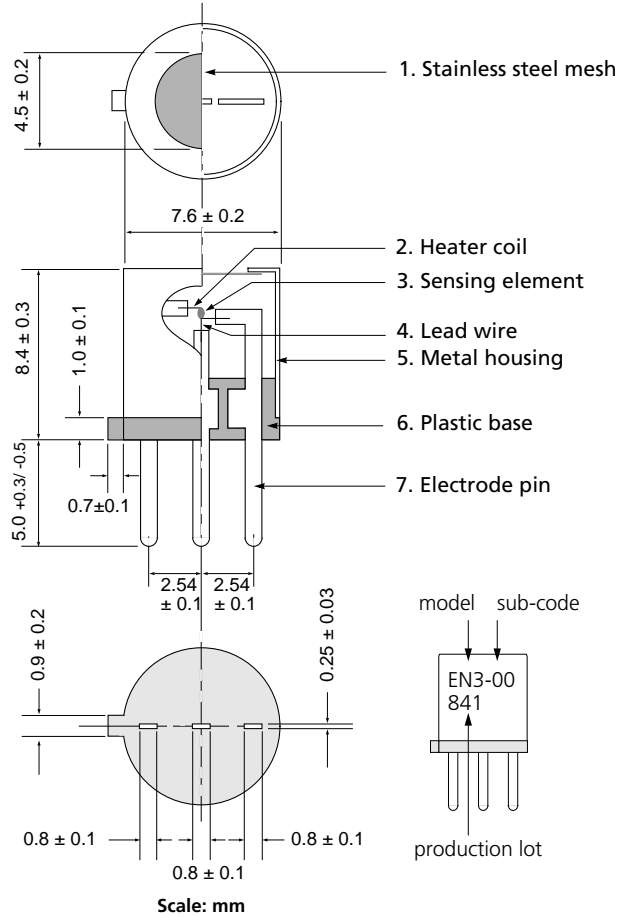
C. Sensitivity characteristics

| Model | SB-EN3-00 (tentative specifications) | | |
|--------------------------------------|--------------------------------------|---|--|
| Symbol | Parameter | Specification | Conditions etc. |
| S/So | Sensitivity (gas/air) | ≤ 0.60 | $\frac{\text{Signal at 1 ppm of CH}_3\text{SH}}{\text{Signal in clean air}}$ |
| Standard Test Conditions: | | Temp: 20 °C \pm 2 °C Humidity: 65% \pm 5% (in clean air) | V_C : 5.0 V \pm 1% V_H : 1.0 V \pm 1% x 5 secs 0.3V \pm 1% R_L : 10 k Ω \pm 5% |
| Pre-heating time: more than 48 hours | | | |

D. Mechanical characteristics

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

Dimensions



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

April, 2001

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