

FIS GAS SENSOR SB-15

for LP-GAS (PROPANE/BUTANE) DETECTION

The SB-15 is a tin dioxide semiconductor gas sensor which has an excellent performance in propane/butane detection. The features are: high sensitivity, low sensitivity to noise gases, quick response speed, strong poisoning resistance and significant low power consumption design (120 mW).

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.

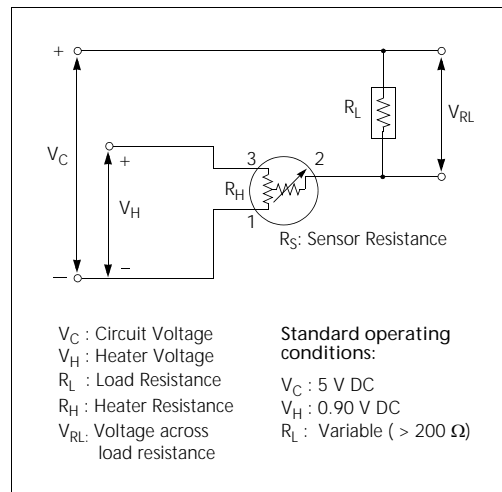


Fig 2. Standard circuit

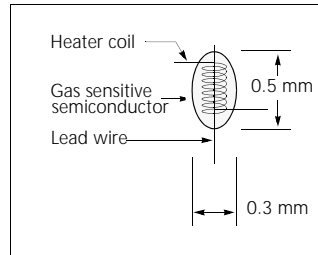


Fig 1a. Sensing element

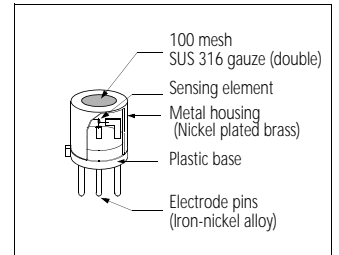


Fig 1b. Configuration

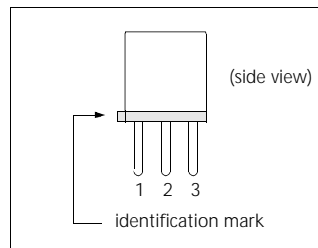


Fig 1c. Pin Layout

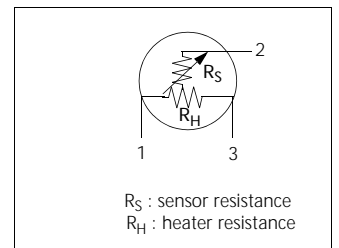


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-15 (typical data). Sensitivity characteristics of the FIS gas sensors are expressed by the relationship between the sensor resistance and gas concentration. The sensor resistance decreases with an increase of gas concentration based on a logarithmic function.

The sensitivity characteristics of the SB-15 is specified by the following parameters.

- Sensor resistance level: at iso-butane 1000 ppm
- Sensor resistance change ratio: between iso-butane 1000 ppm and 3000 ppm

See the specification table on the next page for further details.

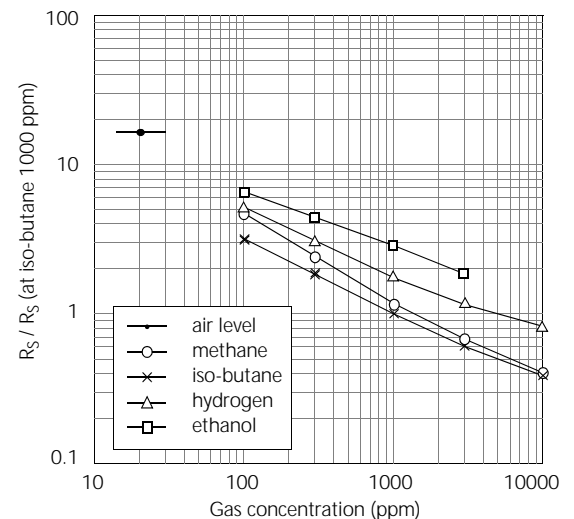


Fig 3. Sensitivity characteristics

Specifications

A. Standard operating conditions

Symbol	Parameter	Specification	Conditions etc.
V_H	Heater voltage	$0.9\text{ V} \pm 0.05\text{ V}$	AC, DC or pulse driving
V_C	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
R_L	Load resistance	Variable (> 200 Ω)	$P_S < 10\text{ mW}$
R_H	Heater resistance	$2.8\ \Omega \pm 0.2\ \Omega$	at room temperature
I_H	Heater current	132 mA	$I_H = V_H / R_H$ (typical value)
P_H	Heater power consumption	120 mW	$P_H = V_H^2 / R_H$ (typical value)

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
T_{ao}	Operating temperature	$-10\text{ }^\circ\text{C}$ to $50\text{ }^\circ\text{C}$	Recommended range
T_{as}	Storage temp	$-30\text{ }^\circ\text{C}$ to $100\text{ }^\circ\text{C}$	
RH	Relative humidity	Less than 95% RH	
(O_2)	Oxygen concentration	$21\% \pm 1\%$ (Standard condition)	Absolute minimum level: more than 18%
		The sensitivity characteristics are influenced by the variation in oxygen concentration. Please consult FIS for details.	

C. Sensitivity characteristics

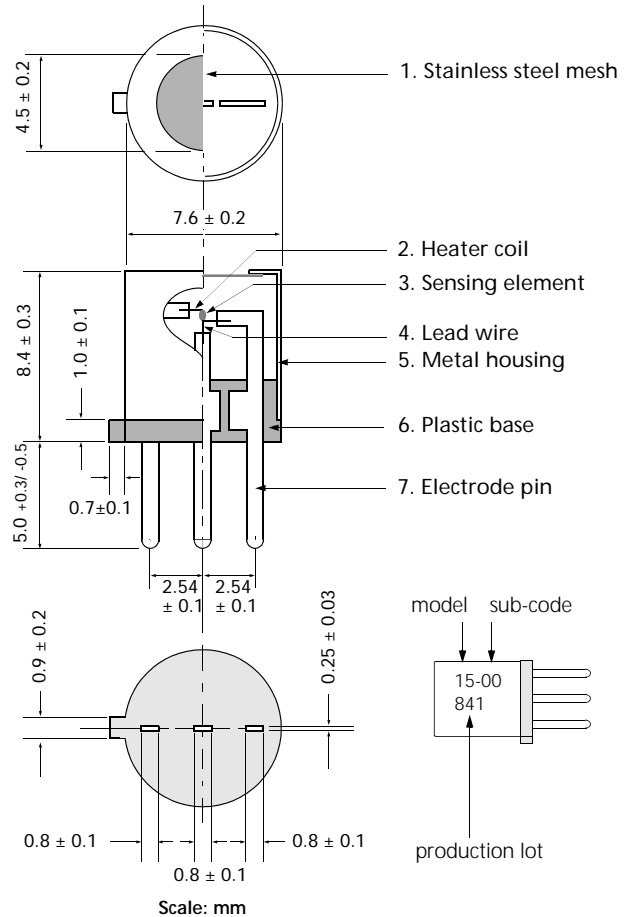
Model	SB-15-00		
Symbol	Parameter	Specification	Conditions etc.
R_S	Sensor resistance	0.2 k Ω to 2.0 k Ω	at 1000 ppm of iso-butane
β	Sensitivity	0.55 to 0.75	$\frac{R_s \text{ (at IB 3000 ppm)}}{R_s \text{ (at IB 1000 ppm)}}$
Standard Test Conditions:		Temp: $20\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$ Humidity: $65\% \pm 5\%$ (in clean air)	V_C : $5.0\text{ V} \pm 5\%$ V_H : $0.9\text{ V} \pm 5\%$ R_L : $750\ \Omega \pm 1\%$ Pre-heating time: more than 48 hours

D. Mechanical characteristics

Items	Conditions	Specifications
Vibration	Frequency:	5 - 500 Hz
	Acceleration:	1.3 G
	Sweep Time:	40 min.
Drop	Height:	60 cm
	Number of impacts:	3 times

Should satisfy the specifications shown in the sensitivity characteristics after test.

Dimensions



Weight : 0.6g

E. Parts and materials

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

Please contact

March 2006

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In the interest of continued product improvement, we reserve the right to change design features without prior notice.

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