FiS

SB-11A

FIS GAS SENSOR SB-11A

for HYDROCARBON DETECTION

The SB-11A is a tin dioxide semiconductor gas sensor which has an excellent performance in methane, propane, butane and other hydrocarbons detection with significant low power consumption concept (120 mW). High sensitivity, low sensitivity to noise gases, quick response speed and strong poisoning resistance features achieve reliable gas detection system applications.

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.

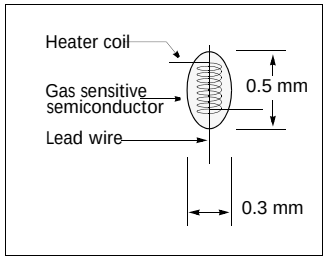


Fig 1a. Sensing element

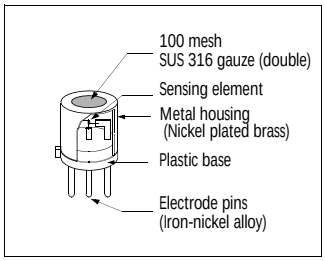


Fig 1b. Configuration

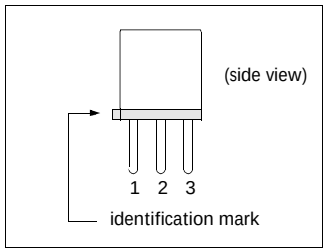


Fig 1c. Pin Layout

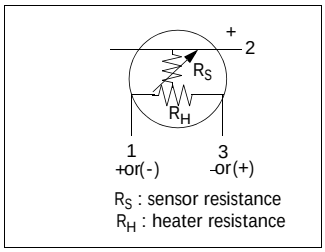


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-11A (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-11A is specified by the following parameters.

- Sensor resistance at methane 3000 ppm
- Sensor resistance change ratio: between methane 1000 ppm and 3000 ppm (slope) and between in air and at methane 3000 ppm.

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

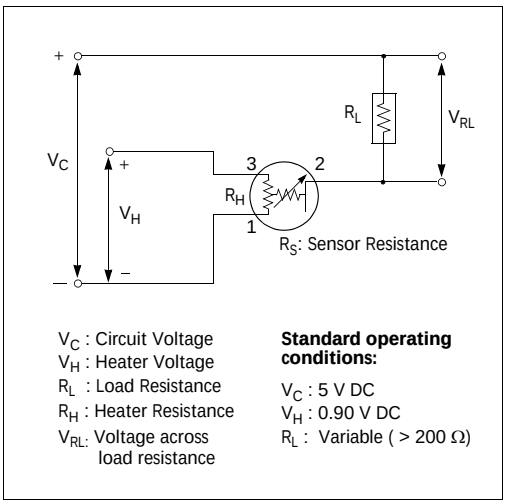


Fig 2. Standard circuit

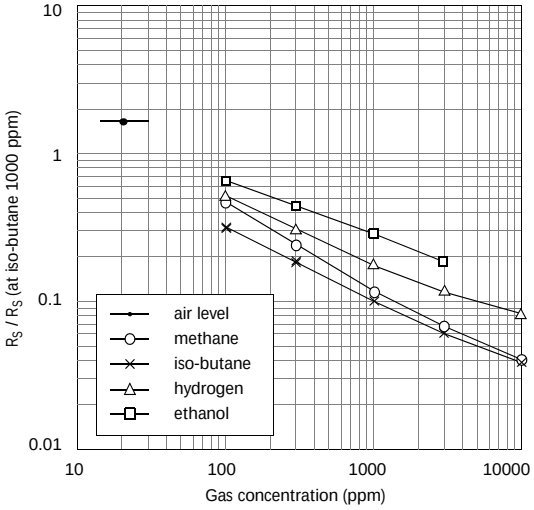


Fig 3. Sensitivity characteristics

SPECIFICATIONS

Specifications

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
V_H	Heater voltage	0.9 V ± 0.05 V	AC or DC
V_C	Circuit voltage	Less than 5 V	DC (polarity is important)
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	130 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)
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	-20 °C to 50 °C	Recommended range
Tas	Storage temp	-20 °C to 70 °C	
RH	Relative humidity	Less than 95% RH	
(O_2)	Oxygen concentration	21% (Standard condition)	Absolute minimum level: more than 18%
		The sensitivity characteristics are influenced by the variation in oxygen concentration.	

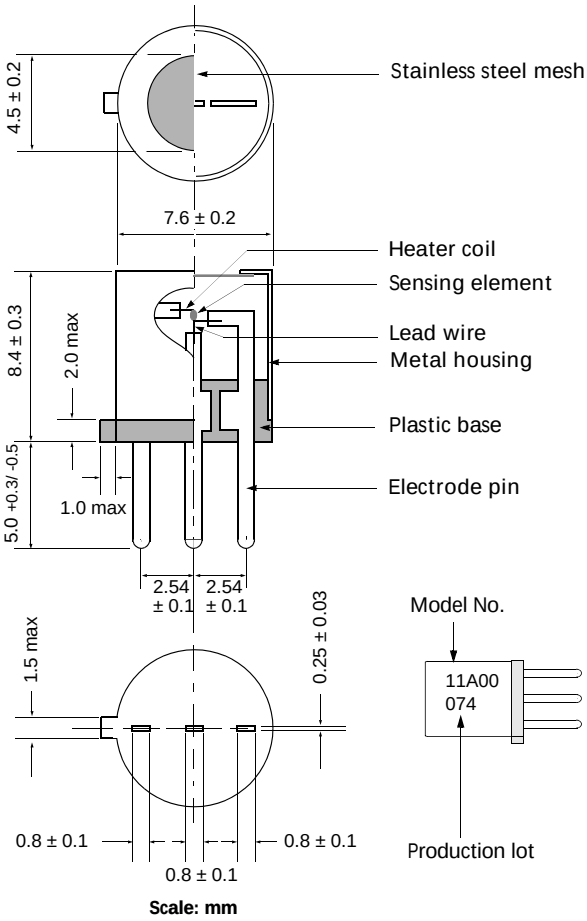
C. Sensitivity characteristics

Model	SB-11A-00 (revised on March 6, 2008)		
Symbol	**Parameter**	**Specification**	**Conditions etc.**
R_S	Sensor resistance	0.2kΩ to 1.0 kΩ	at methane 3000 ppm
β	Sensitivity	0.48 to 0.68	$\frac{Rs\ (at\ CH_4\ 3000\ ppm)}{Rs\ (at\ CH_4\ 1000\ ppm)}$
γ	Sensitivity	≥ 8.0	$\frac{Rs\ (in\ air)}{Rs\ (at\ i\text{-}C_4H_{10}\ 1000\ ppm)}$
Δ	Sensitivity	≥ 10.0	$\frac{Rs\ (in\ air)}{Rs\ (at\ CH_4\ 3000\ ppm)}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity:65% ± 5% (in clean air)	V_C : 5.0 V ± 1% V_H : 0.9 V ± 1% RL : 750 Ω ± 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

Weight : 0.6g

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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