

SB-12A-00

# FIS GAS SENSOR SB-12A-00

## for METHANE DETECTION

The SB-12A is a tin dioxide semiconductor gas sensor which has an excellent performance in methane 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 (Fig1b).

### 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.

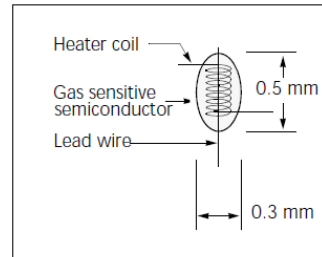


Fig 1a. Sensing element

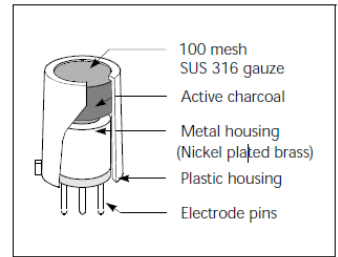


Fig 1b. Configuration

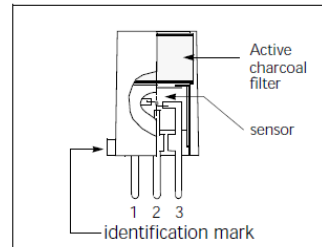


Fig 1c. Pin Layout

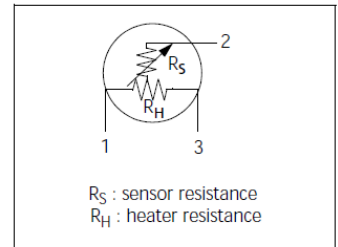


Fig 1d. Equivalent circuit

### Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-12A (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-12A is specified by the following parameters.

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

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

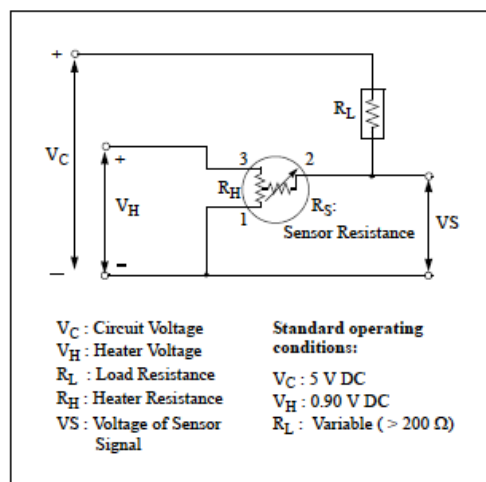


Fig 2. Standard circuit

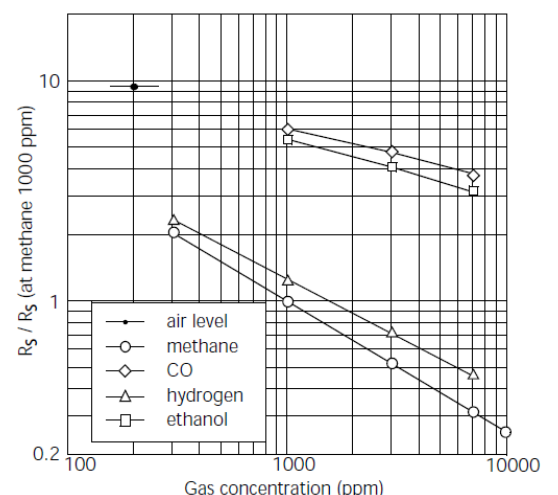


Fig3. Sensitivity characteristics

## Specifications: SB-12A-00

### A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH	Heater voltage	0.9 V ± 0.05 V	AC, DC or pulse
VC	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
RL	Load resistance	Variable (> 200 Ω)	P <sub>s</sub> < 10 mW
RH	Heater resistance	2.8 Ω ± 0.2 Ω	at room temperature
IH	Heater current	130mA (Typical value)	IH = VH / RH
PH	Heater power consumption	120 mW (Typical value)	PH = VH <sup>2</sup> / RH
PS	Power dissipation of sensing element	Less than 10mW	$P_s = \frac{(V_C - V_{RL})^2}{R}$

### B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
T <sub>ao</sub>	Operating temperature	-10 °C to 50 °C	
T <sub>as</sub>	Storage temp	-20 °C to 60 °C	
RH	Relative humidity	Less than 95%RH	
(O <sub>2</sub> )	Oxygen concentration	21% ± 1% (Standard condition) The sensitivity characteristics are influenced by the variation in oxygen concentration. Please consult FIS for details.	Absolute minimum level : more than 18%.

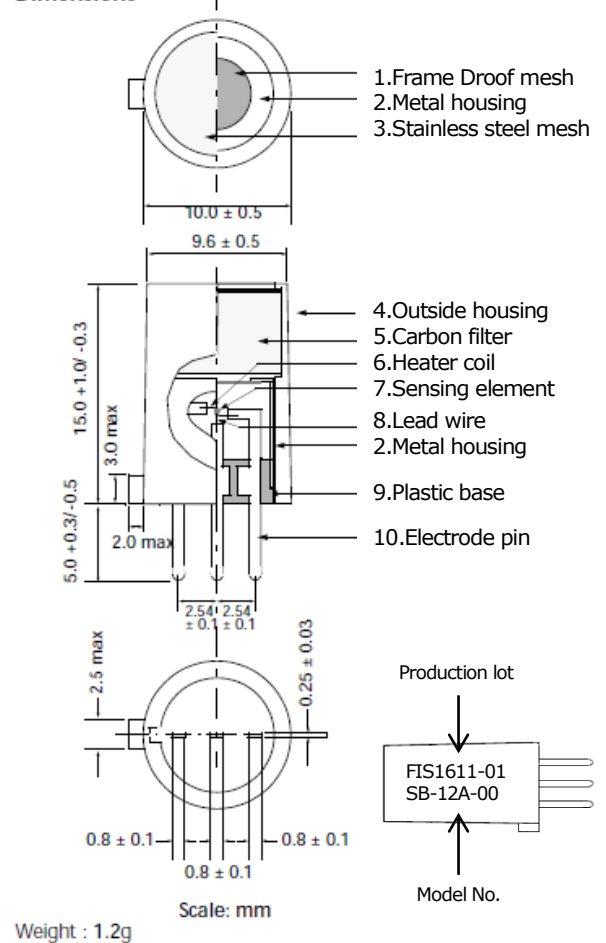
### C. Sensitivity characteristics

Model SB-12A-00			
Symbol	Parameter	Specification	Conditions etc.
R <sub>s</sub>	Sensor resistance	0.2 kΩ to 1.0 kΩ	at CH <sub>4</sub> 3000ppm
β	Ratio of sensor resistance	0.45 to 0.65	$\frac{R_s \text{ (at CH}_4 \text{ 3000ppm)}}{R_s \text{ (at CH}_4 \text{ 1000ppm)}}$
Ethanol selectivity		≥ 5.0	$\frac{R_s \text{ (at Ethanol 1000ppm)}}{R_s \text{ (at CH}_4 \text{ 3000ppm)}}$
CH <sub>4</sub> selectivity		≥ 9.0	$\frac{R_s \text{ in air}}{R_s \text{ (at CH}_4 \text{ 3000ppm)}}$
Standard Test Conditions: Temp : 20°C±2°C      VC : 5.0 V ± 1 % Humidity : 65%±5%      VC : 0.9 V ± 1 % (in clean air)      RL : 10 kΩ ± 5% Pre-heating time: more than 48 hours			

### D. Mechanical characteristics

Items	Conditions	Specifications
Vibration	Frequency : 5 - 500 Hz	Should satisfy the specifications shown in the sensitivity characteristics after test.
	Acceleration : 1.3 G	
	Sweep Time : 40 min.	
Drop	Height : 60 cm	
	Number of impacts : 3 times	

### Dimensions



### E. Parts and Materials

No.	Parts	Materials
1	Flameproof mesh	SUS 316 (100 mesh, double)
2	Metal housing	Nickel plated brass
3	Stainless steel mesh	SUS 316 (100 mesh, single)
4	Outside housing	Nylon 6 (UL94 V-0)
5	Carbon filter	Activated carbon
6	Heater coil	Platinum
7	Sensing element	Tin dioxide
8	Lead wire	Platinum
9	Plastic base	PBT (poly butylen telephthalate)
10	Electrode pins	Iron-nickel alloy

### Please contact

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