

# SB-96-00

## FIS GAS SENSOR SB-96-00 for CARBON MONOXIDE AND LP DETECTION

### General

The SB-96 is a tin dioxide semiconductor gas sensor which has an excellent performance in detecting both CO and iso-butane/propane selectively with single sensor element. This unique feature was realized by using a mini-bead type sensing element with a periodic temperature changing operation method.

### 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. This sensor unit is placed in an external housing which contains nonwoven filter (Fig 1b).

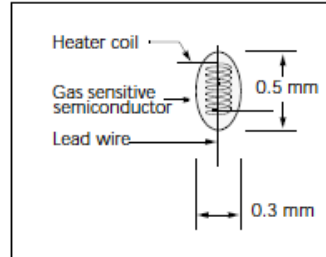


Fig 1a. Sensing element

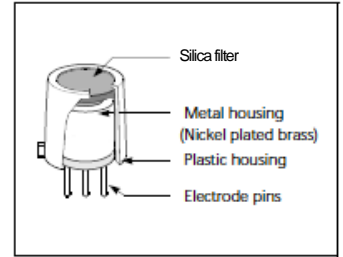


Fig 1b. Configuration

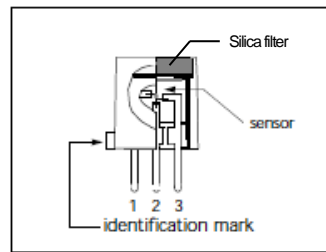


Fig 1c. Pin Layout

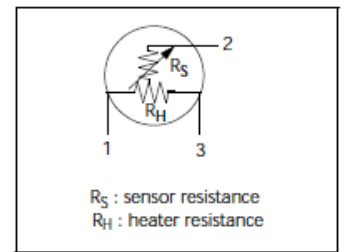


Fig 1d. Equivalent circuit

### Operating conditions

When the sensor is operated with high/low periodic operation (Fig 2), sensor signal changes according to the temperature dependency characteristics. By detecting the sensor signal at sufficient timings (at a high temperature for iso-butane and at a low temperature for CO), selective detection of both isobutene and CO has been achieved. Figs 3a and 3b show the sensitivity characteristics of the SB-96, at high temperature and at low temperature signals respectively.

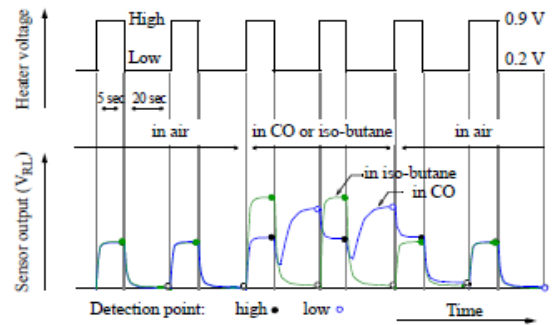


Fig2. SB-96-00: operating conditions and output signal

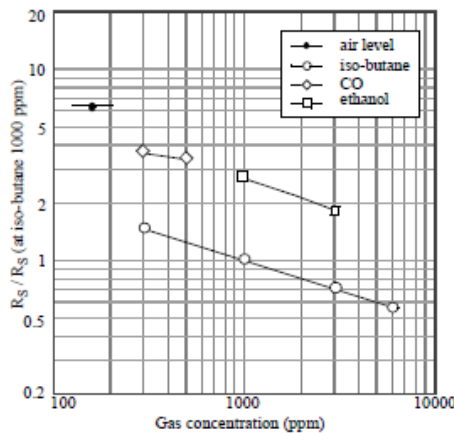


Fig3a. SB-96-00: Sensitivity at HIGH

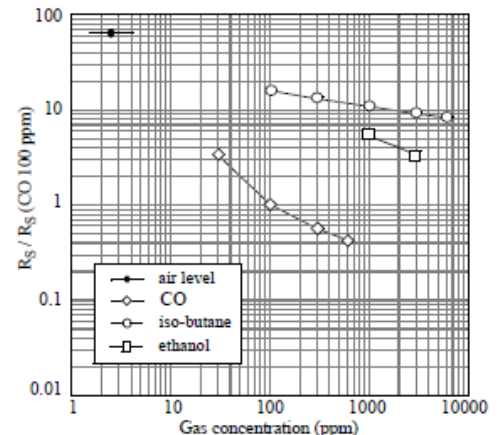


Fig3b. SB-96-00: Sensitivity at LOW signal

## Specifications: SB-96-00

### A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH(H)	Heater voltage (high)	0.9 V ± 5%	AC, DC or pulse
VH(L)	Heater voltage (low)	0.2 V ± 5%	AC, DC or pulse
VC	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
RL	Load resistance	Variable (> 200 Ω)	PS < 10 mW
RH	Heater resistance	2.8 Ω ± 0.2 Ω	at room temperature
TH(H)	Heating time (high)	5 sec ± 0.1 sec	
TH(L)	Heating time (low)	20 sec ± 0.1 sec	
DT (L)	Detection timing (low)	< 0.1sec	before switching to HIGH
IS(H)	Current consumption(high)	132mA ± 15mA	VH=0.9V
IS(L)	Current consumption(low)	59mA ± 10mA	VH=0.2V
PS	Power dissipation of sensing element	Less than 10 mW	$P_s = \frac{(V_C - V_{RL})^2}{R}$

### B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
Tao	Operating temperature	-10 °C to 50 °C	
Tas	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%.

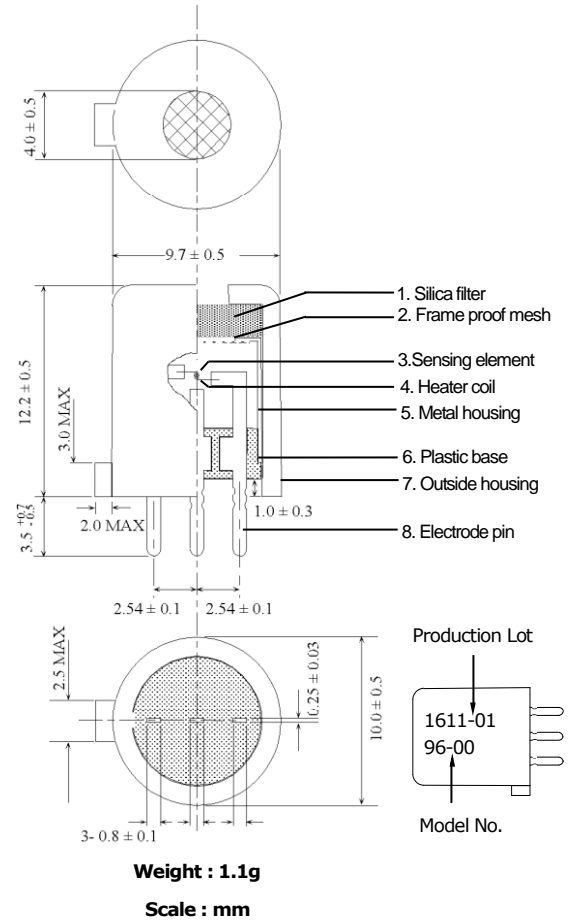
### C. Sensitivity characteristics

SB-96-00			
Model	Parameter	Specification	Conditions etc.
Rs (L)	Sensor resistance at LOW period	4.5 kΩ - 45 kΩ	at 100ppm of CO
α (L) (30-100)	Sensitivity slope (30- 100 ppm)	0.70 to 2.5	$\frac{\log(R_s(30 \text{ ppm}) / R_s(100\text{ppm}))}{\log(30/100)}$
α (L) (100-300)	Sensitivity slope at LOW	0.4 to 1.2	$\frac{\log(R_s(300 \text{ ppm}) / R_s(100\text{ppm}))}{\log(300/100)}$
RS (H)	Sensor resistance at HIGH period	0.35 kΩ - 3.5 kΩ	at 3000 ppm of iso-butane
β (H)	Sensitivity slope at HIGH period	0.40 to 0.70	$\frac{R_s \text{ (at 3000 ppm of iso-butane)}}{R_s \text{ (at 500 ppm of iso-butane)}}$
Temp: 20 oC ± 2 oC Humidity: 65% ± 5% Standard Test Conditions: (in clean air ) RL (high) : 750Ω ± 1% (Low) : 10 kΩ ± 1% Pre-heating time: more than 4 days			

**Please contact**

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

### Dimensions



### D. Mechanical characteristics

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

### E. Parts and Materials

No.	Parts	Materials
1	Silica filter	Silica
2	Frame proof mesh	SUS 316 (100 mesh, double)
3	Sensing element	Tin dioxide
4	Heater coil	Platinum
5	Metal housing	Nickel plated brass
6	Plastic base	PBT (GF30%)
7	Outside housing	Nylon 6 (UL94 V-0)
8	Electrode pin	Iron-nickel alloy

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Nissha FIS, Inc.  
3-36-3, Kitazono  
Itami, Hyogo  
664-0891 Japan

Tel: +81-72-780-1800

Fax: +81-72-785-0073

<http://www.fisinc.co.jp>