

# FIS GAS SENSOR SB-43A-00

## for REFRIGERANT DETECTION

The SB-43A is a tin dioxide semiconductor gas sensor which has a high sensitivity to various freons with improved cross sensitivity to other gases. This model is suitable for R32, R410A, R407C, HFO1234yf and other new Freon. A significant feature of low power consumption design (120 mW) is advantageous for portable devices.

### 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 has silicon poison proof silica filter.

### 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.

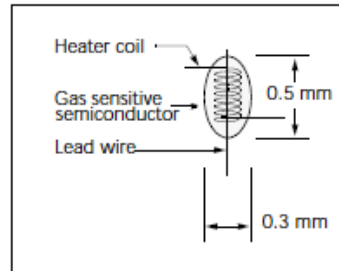


Fig 1a. Sensing element

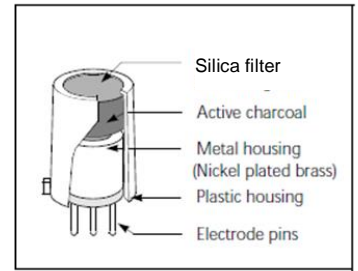


Fig 1b. Configuration

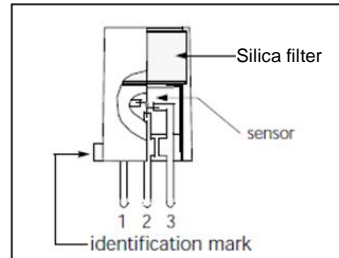


Fig 1c. Pin Layout

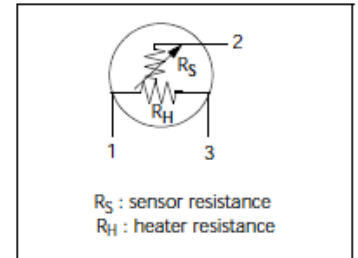


Fig 1d. Equivalent circuit

### Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-43A (typical data). Sensitivity characteristics of the Nissha 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-43A is specified by the following parameters.

- Sensor resistance level: at 3000 ppm of R410A
- Sensor resistance change ratio: between R410A 3000ppm and 6000 ppm
- Sensitivity of R410A: the sensor resistance ratio of between in air and at R410A 3000ppm

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

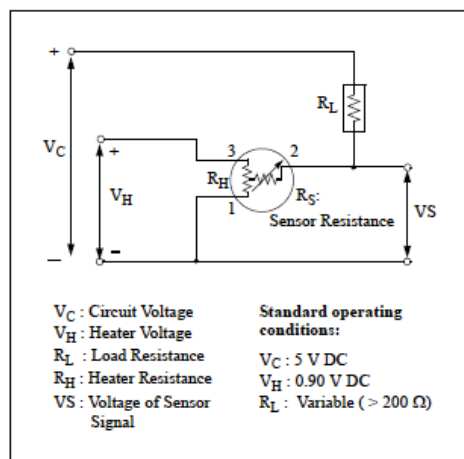


Fig 2. Standard circuit

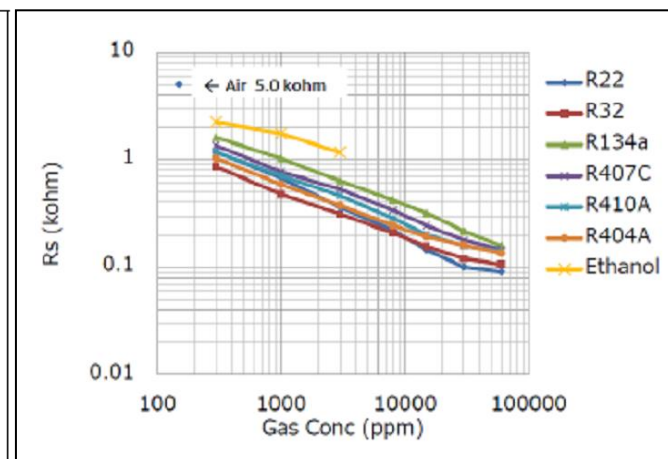


Fig 3. Sensitivity characteristics

## Specifications: SB-43A-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.
Tao	Operating temperature	-10 °C to 50 °C	
Tas	Storage temp	-20 °C to 60 °C	
RH	Relative humidity	Less than 95%RH (Do not condense into dew)	
(O <sub>2</sub> )	Oxygen concentration	21% ± 1% (Standard condition)	Absolute minimum level : more than 18%.
		The sensitivity characteristics are influenced by the variation in oxygen concentration. Please consult us for details.	
Others		Exposure to solvents and/or silicone compounds must be avoided. Sensitivity characteristics may be effected.	

### C. Sensitivity characteristics

Model SB-43A-00			
Symbol	Parameter	Specification	Conditions etc.
R <sub>S</sub>	Sensor resistance	0.3k ~ 3.0kΩ	at 3000 ppm of R410A
β	Sensitivity	0.4 ~ 0.7	$\frac{R_S \text{ (at R410A 6000 ppm)}}{R_S \text{ (at R410A 3000 ppm)}}$
Sensitivity of R410A		more than 5	$\frac{R_S \text{ (in air)}}{R_S \text{ (at R410A 3000 ppm)}}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air) Pre-heating time: more than 4 days	VC : 5.0 V ± 1 % VH : 0.9 V ± 1 % RL : 10 kΩ ± 5 %

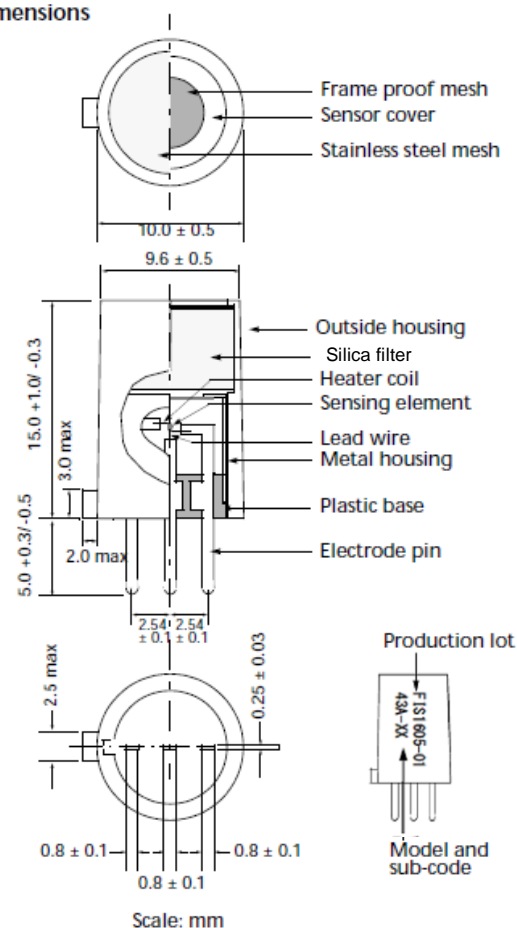
### D. Mechanical characteristics

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

### Please contact

### Dimensions

### Dimensions



Weight : 1.1g

### 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 / Lead wire	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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In the interest of continued product improvement, we reserve the right to change design features without prior

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