# FIS GAS SENSOR SB-42A

### for REFRIGERANT DETECTION(R134a,R-410a,R-407c)

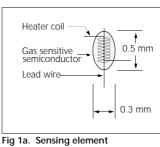
The SB-42A is a tin dioxide semiconductor gas sensor which has a high sensitivity to HFCs (e.g. Freon: R-134a) with improved cross sensitivity to other gases. This model is suitable for R-134a, R-410a, R-407c and other new freon family which contains R-134a. A significant feature of low power consumption design (120 mW) is advantageous for portable devices.

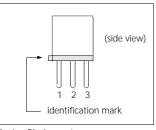
### Structure

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. 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 1c. Pin Layout

### Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-42A (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.

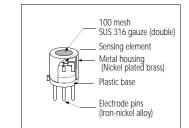


Fig 1b. Configuration

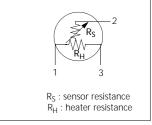
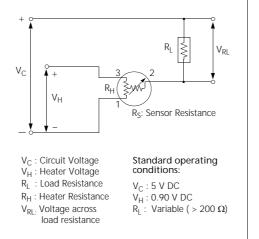
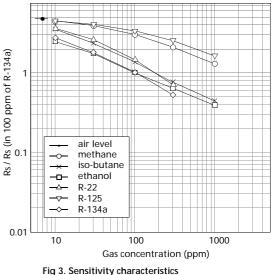


Fig 1d. Equivalent circuit

The sensitivity characteristics of the SB-42A is specified by the following parameters.

- Sensor resistance level: at 100 ppm of R-134a
- Sensor resistance change ratio: between R-134a 100 ppm and 300 ppm See the specification table on the next page for further details.





SPECIFICATIONS

Fig 2. Standard circuit

## Specifications

### A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
V <sub>H</sub>	Heater voltage	0.9 V ± 0.05V	AC, DC or pulse
V <sub>C</sub>	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
RL	Load resistance	Variable (> 200 Ω)	P <sub>S</sub> < 10 mW
R <sub>H</sub>	Heater resistance	$2.8\Omega\pm0.2\Omega$	at room temperature
Ι <sub>Η</sub>	Heater current	130 mA	$I_{H} = V_{H} / R_{H}$ (typical value)
P <sub>H</sub>	Heater power consumption	120 mW	$P_{H} = V_{H}^{2} / R_{H}$ (typical value)
P <sub>S</sub>	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.
Тао	Operating temperature	-10°C to 60 °C	
Tas	Storage temp	-20 °C to 70 °C	Recommended range
RH	Relative humidity	Less than 95% RH	
(O <sub>2</sub> )	Oxygen	21% ± 1% (Standard condition)	Absolute minimum level: more than 18%
	concentration		eristics are influenced by the ncentration. Please consult FIS

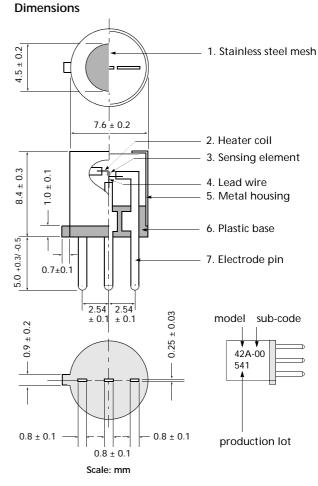
### C. Sensitivity characteristics

Model	SB-42A-00 (tentative specifications)		
Symbol	Parameter	Specification	Conditions etc.
R <sub>S</sub>	Sensor resistance	2 k $\Omega$ to 20 k $\Omega$	at 100 ppm of R-134a/air
β	Ratio of sensor resistance	0.50 to 0.65	$\frac{R_{S} \text{ at 300 ppm of } R-134a}{R_{S} \text{ at 100 ppm of } R-134a}$
R/Rair	Resistance change in gas/air	≤ 0.40	R <sub>S</sub> at 100 ppm of R-134a R <sub>S</sub> in air
Standard Test Conditions:		Temp: $20 ^{\circ}\text{C} \pm 2 ^{\circ}\text{C}$ Humidity: $65\% \pm 5\%$ (in clean air)	$\begin{array}{l} V_C: \ 5.0 \ V \pm 1\% \\ V_H: \ 0.9 \ V \pm 1\% \\ R_L: \ 10 \ k\Omega \pm 5\% \end{array}$
		Pre-heating time: mo	re than 48 hours

### D. Mechanical characteristics

Items	Condit	ions	Specifications
Vibration	Frequency: Vertical amplitude: Duration:	100 cpm 4 mm 1 hour	Should satisfy the specifications shown in the sensitivity characteristics after
Shock	Acceleration: Number of impacts:	100 G 5 times	test.

### Please contact



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 <sub>2</sub> )
4	Lead wire	Platinum
5	Metal housing	Nickel plated brass
6	Plastic base	PBT (Poly butylene terephthalate)
7	Electrode pins	Iron-nickel alloy

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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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