

SB-42A-00

FIS GAS SENSOR SB-42A-00

for REFRIGERANT DETECTION(R134a,R410a,R407c)

The SB-42A-00 is a tin dioxide semiconductor gas sensor which has a high sensitivity to HFCs (e.g. Freon: R134a) with improved cross sensitivity to other gases. This model is suitable for R134a, R410a, R407c and other new Freon family which contains R134a. 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 (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.

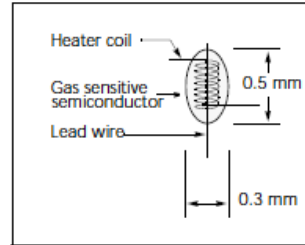


Fig 1a. Sensing element

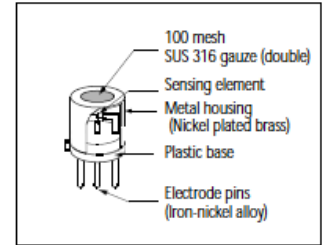


Fig 1b. Configuration

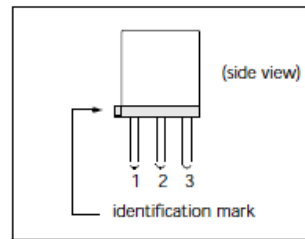


Fig 1c. Pin Layout

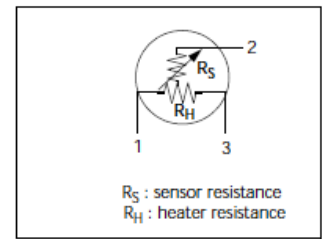


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-42A-00 (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-42A-00 is specified by the following parameters.

- Sensor resistance level: at 100 ppm of R134a
- Sensor resistance change ratio: between R134a 100ppm and 300 ppm

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

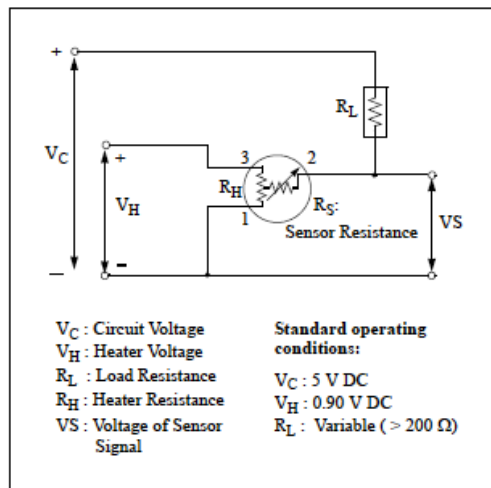


Fig 2. Standard circuit

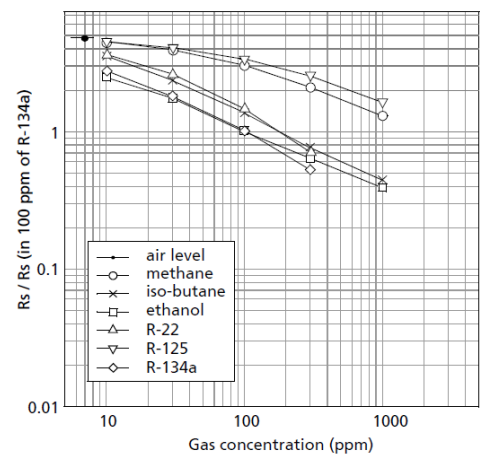


Fig3. Sensitivity characteristics

SPECIFICATIONS

Specifications: SB-42A-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 _s < 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 ² / 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 _{ao} | Operating temperature | -10 °C to 50 °C | |
| T _{as} | Storage temp | -20 °C to 60 °C | |
| RH | Relative humidity | Less than 95%RH | |
| (O ₂) | 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-42A-00 | | |
|---------------------------|------------------------------|--|--|
| Symbol | Parameter | Specification | Conditions etc. |
| R _s | Sensor resistance | 2 kΩ to 20kΩ | at 1000 ppm of R134a |
| β | Sensitivity | 0.55 to 0.65 | <u>R_s at 300ppm of R134a</u> <u>R_s at 100ppm of R134a</u> |
| Δ | Resistance change in gas/air | Lower than 0.40 | <u>R_s at 100ppm of R134a</u> <u>R_s in air</u> |
| Standard Test Conditions: | | Temp : 20°C±2°C Humidity : 65%±5% (in clean air) Pre-heating time: more than 48 hours | VC : 5.0 V ± 1 % VC : 0.9 V ± 1 % RL : 10 kΩ ± 5% |

D. Mechanical characteristics

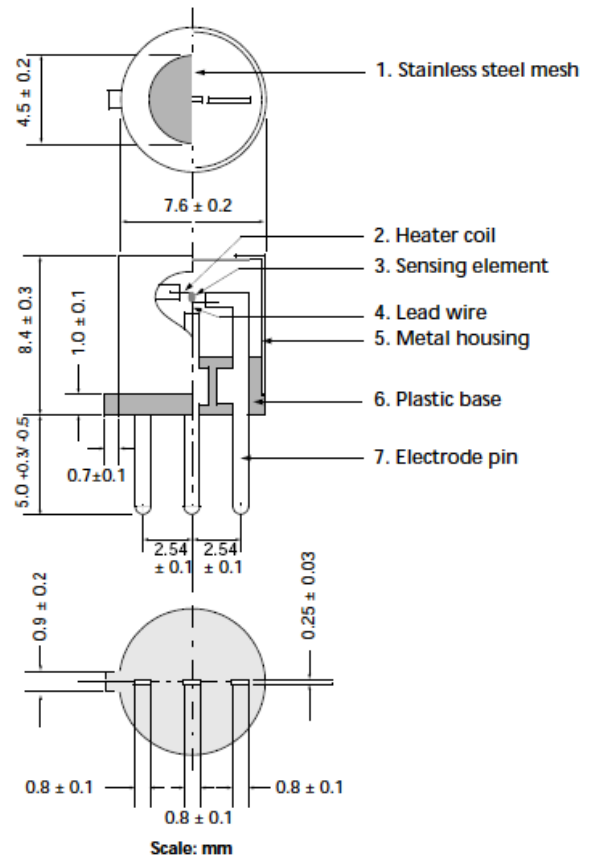
| Items | Conditions | Specifications |
|-----------|-----------------------------|--|
| Vibration | Frequency : 5 - 500 Hz | Should satisfy the specifications shown in the sensitivity characteristics after test. |
| | Acceleration : 1.3 G | |
| | Sweep Time : 40 min. | |
| Drop | Height : 60 cm | |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

Please contact

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| | <p>JANUARY, 2018</p> <hr/> <p>Nissha FIS, Inc. 3-36-3,Kitazono Itami,Hyogo 664-0891 Japan</p> <hr/> <p>Tel: +81-72-780-1800 Fax: +81-72-785-0073 http://www.fisinc.co.jp</p> <hr/> |
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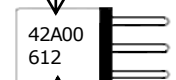
In the interest of continued product improvement, we reserve the right to change design features without prior notice.

Dimensions



Weight : 0.6g

Model No.



Production lot

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 |
| 4 | Lead wire | Platinum |
| 5 | Metal housing | Nickel plated brass |
| 6 | Plastic base | PBT (GF30%) |
| 7 | Electrode pin | Iron-nickel alloy |