

FIS GAS SENSOR SB-43

for REFRIGERANT DETECTION (R-134a,R-410A,R-407c,HFO1234yf)

The SB-43 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 R-134a, R-410A, R-407c ,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. 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.

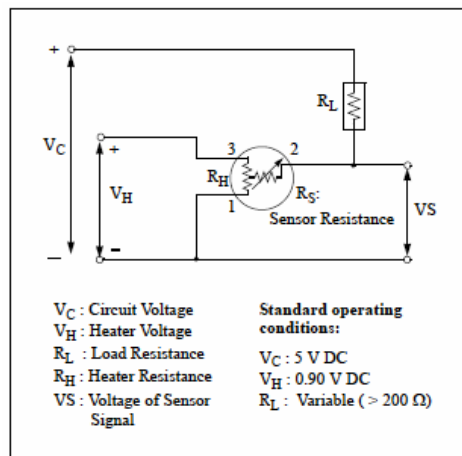


Fig 2. Standard circuit

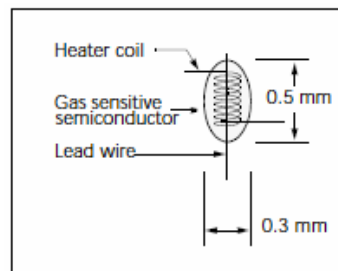


Fig 1a. Sensing element

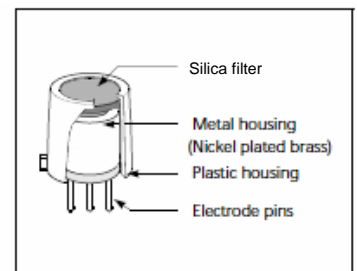


Fig 1b. Configuration

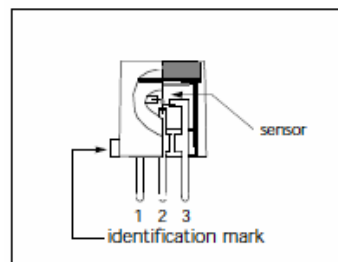


Fig 1c. Pin Layout

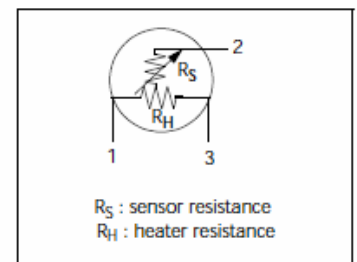


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-43 (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-43 is specified by the following parameters.

- Sensor resistance level: at 3000 ppm of R-410A
- Sensor resistance change ratio: between R-410A 1000ppm and 3000 ppm
- Sensitivity of R-410A: the sensor resistance ratio of between in air and at R410A 1000ppm

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

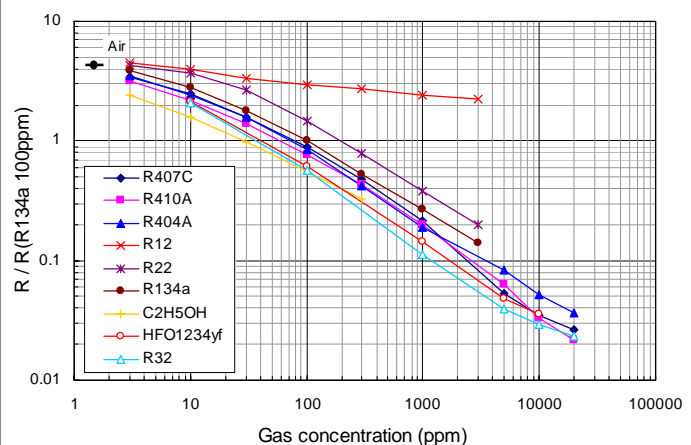


Fig. 3 Sensitivity characteristics

Specifications

A. Standard operating conditions

Symbol	Parameter	Specification	Conditions etc.
V _H	Heater voltage	0.9V ± 5%	Recommendation ; ± 2%
V _C	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
R _L	Load resistance	Variable (>200)	Choose the most suitable
R _H	Heater resistance	2.8 ± 0.2	at room temperature
I _H	Heater current	132mA ± 15mA	at V _H =0.9V
P _H	Heater power consumption	120mW	

It is possible to choose pulse DC drive (ex. 5VDC) for V_H.

B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
T _{ao}	Operating temperature	-10 °C to 50 °C	Please consult FIS for operating and/or storing sensors out of the specified ranges.
T _{as}	Storage temp	-30 °C to 70 °C	
RH	Relative humidity	Less than 95%RH (Do not condense into dew)	
Others		Exposure to solvents and/or silicone compounds must be avoided. Sensitivity characteristics may be effected.	

C. Sensitivity characteristics

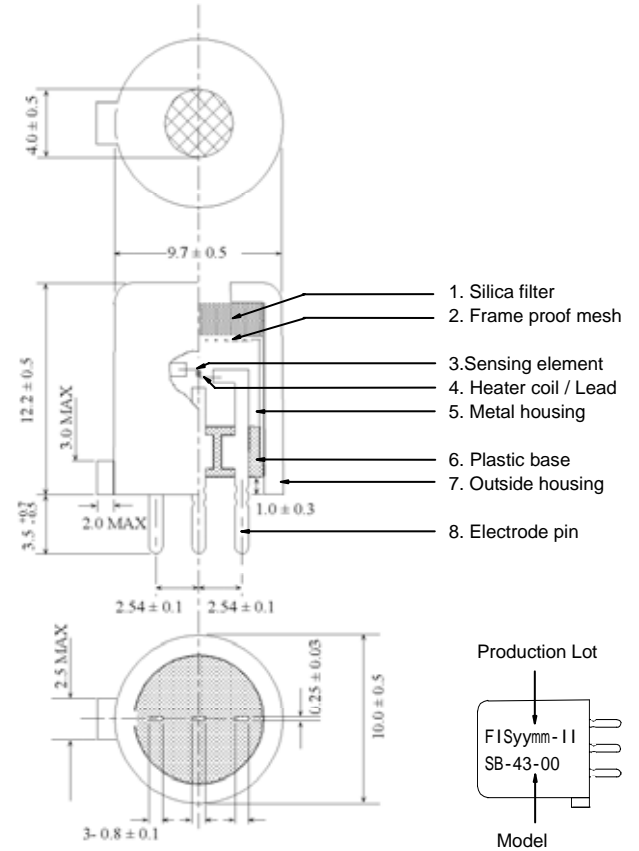
Model	SB-43-00		
Symbol	Parameter	Specification	Conditions etc.
R _S	Sensor resistance	0.1 k ~ 1.0k	at 3000 ppm of R410A
	Slope	0.4 ~ 0.6	$\frac{R_S \text{ (at R410A 1000 ppm)}}{R_S \text{ (at R410A 3000 ppm)}}$
Sensitivity of iso-butane		more than 5	$\frac{R_S \text{ (in air)}}{R_S \text{ (at R410A 1000 ppm)}}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air) Pre-heating time: more than 4 days	

D. Mechanical characteristics

Items	Conditions	Specifications
Vibration	Frequency:	5-500 Hz
	Acceleration:	1.3G
	Sweep Time:	40min.
Drop	Height:	60 cm
	Number of impacts:	3 times

Should satisfy the specifications shown in the C. Sensitivity characteristics after test

Dimensions



Scale : mm

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

Please contact

July 2011

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>

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