FIS

SB-AD2

FIS GAS SENSOR SB-AD2

for diesel exhaust detection

The SB-AD2 is a tin dioxide semiconductor gas sensor which has a high sensitivity to NO_2 with quick response speed. This model is suitable for diesel exhaust detection in air quality modules of automobiles.

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.

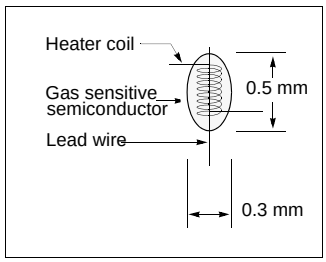


Fig 1a. Sensing element

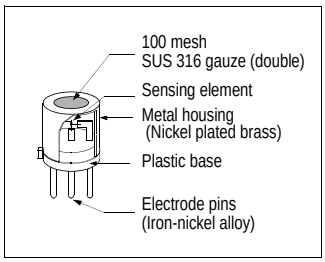


Fig 1b. Configuration

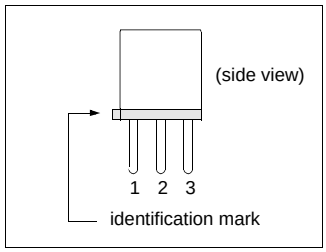


Fig 1c. Pin Layout

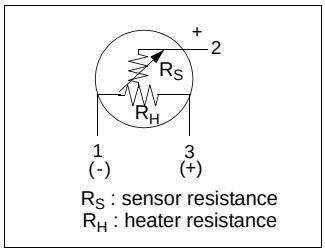


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SB-AD2 (typical data). Sensitivity characteristics of the FIS gas sensors are expressed by the relationship between the sensor resistance and gas concentration. The sensor resistance increases with an increase of gas concentration based on a logarithmic function.

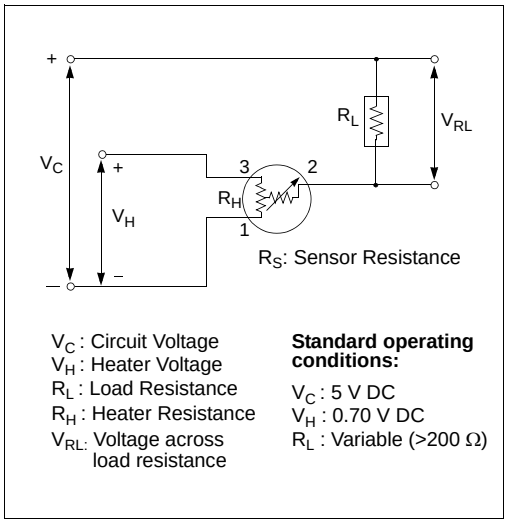


Fig 2. Standard circuit

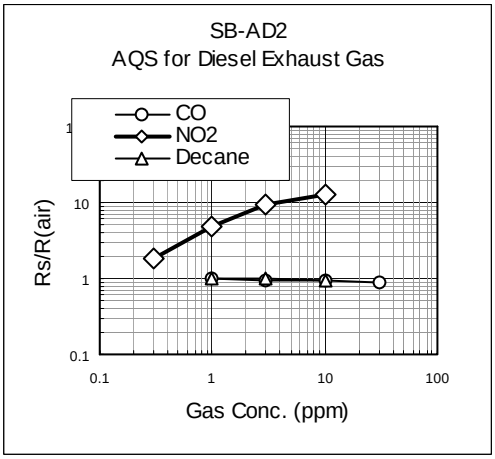


Fig 3. Sensitivity characteristics

SPECIFICATIONS

Specifications

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
V_H	Heater voltage	0.7 V ± 0.035V	Heat Cleaning 0.9v(120mW) 10sec.
V_C	Circuit voltage	Less than 5 V	DC: Pin3 (+) - Pin 1 (-)
R_L	Load resistance	Variable (> 200 Ω)	P_S < **10** mW
R_H	Heater resistance	2.8 Ω ± 0.2 Ω	at room temperature
I_H	Heater current	18 mA (DC=4.6v)	$I_H = V_H / R_H$ (typical value)
P_H	Heater power consumption	83 m	$P_H = V_H^2 / R_H$ (typical value)
P_S	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.
Tao	Operating temperature	-40 °C to 85 °C	Recommended range
Tas	Storage temp	**-20** °C to **70** °C	
RH	Relative humidity	10 to 95% RH	
(O_2)	**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 FIS for details.	

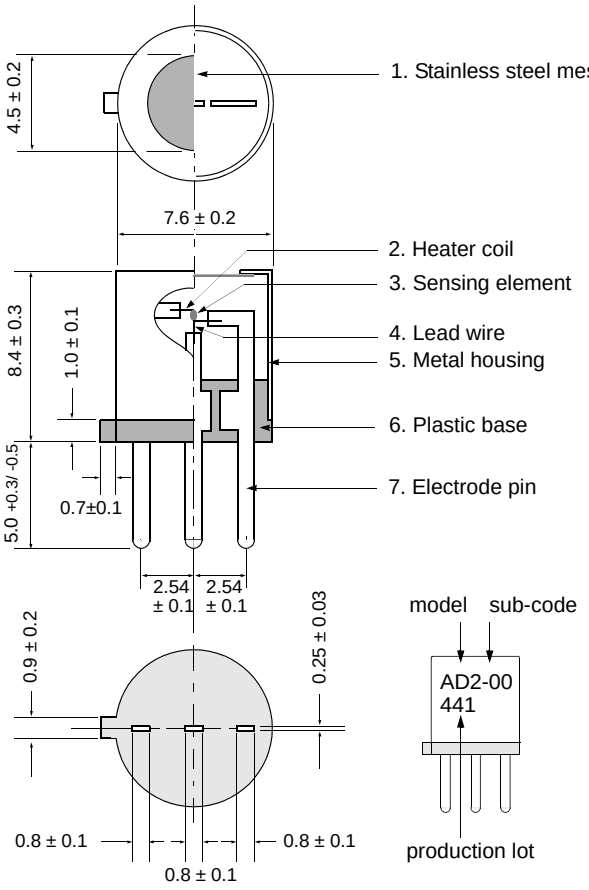
C. Sensitivity characteristics

Model	SB-AD2-00		
Symbol	**Parameter**	**Specification**	**Conditions etc.**
Rs(air)	Sensor resistance in air	2 kΩ to 70kΩ	in clean air
	Sensitivity to NO_2	more than 1.2	$\frac{Rs(0.3ppm\ of\ NO_2)}{Rs(air)}$
		more than 1.5	$\frac{Rs(1ppm\ of\ NO_2)}{Rs(air)}$
	NO_2 response	more than 1.3	$\frac{Rs(at\ 30sec\ after\ 1ppm\ NO_2\ injection)}{Rs(air)}$
	CO selectivity	more than 1.3	$\frac{Rs(3ppm\ CO + 1ppm\ NO_2)}{Rs(air)}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air)	**V_C: 5.0 V ± 1%** **V_H: 0.7 V ± 1%** **R_L: 750 Ω ± 5%**
		Pre-heating time: more than 48 hours	

D. Mechanical characteristics

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

Dimensions



Scale: mm

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_2)
4	Lead wire	Platinum
5	Metal housing	Nickel plated brass
6	Plastic base	PBT (Poly butylene terephthalate)
7	Electrode pins	Iron-nickel alloy

Please contact

June, 2004

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