

SP-12A-00

FIS GAS SENSOR SP-12A-00

for METHANE DETECTION

The SP-12A is a tin di-oxide semiconductor gas sensor which has a good sensitivity and excellent selectivity to methane. The SP-12A has also a significant feature in good stability after exposure to silicone compounds. Using the SP-12A, the most reliable methane detection can be achieved.

Structure

Gas sensitive semiconductor material is formed on the alumina substrate on which the gold electrodes are printed. A thick film heater of ruthenium oxide is printed on the reverse of the substrate and placed in the plastic housing (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 Specification table on the next page.

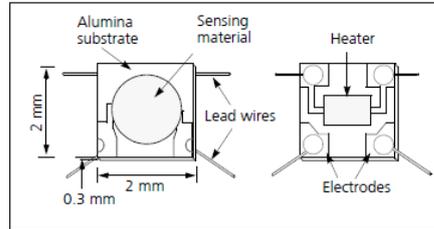


Fig 1a. Sensing element

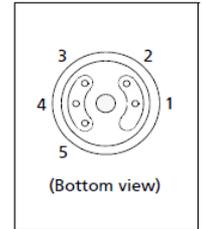


Fig 1c. Pin Layout

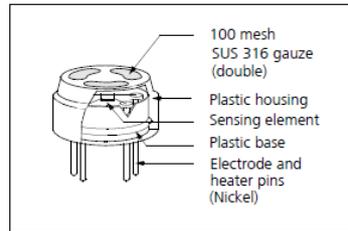


Fig 1b. Configuration

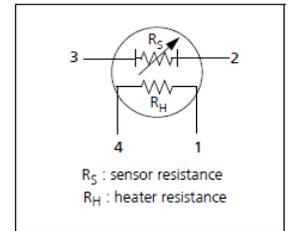


Fig 1d. Equivalent circuit

Sensitivity characteristics

Fig 3 shows the sensitivity characteristics curves of the SP-12A (typical data). Sensitivity characteristics of our 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 SP-12A is specified by the following parameters.

- Sensor resistance level: at methane 5000 ppm
- Sensor resistance change ratio: between methane 3000 ppm and 7000 ppm

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

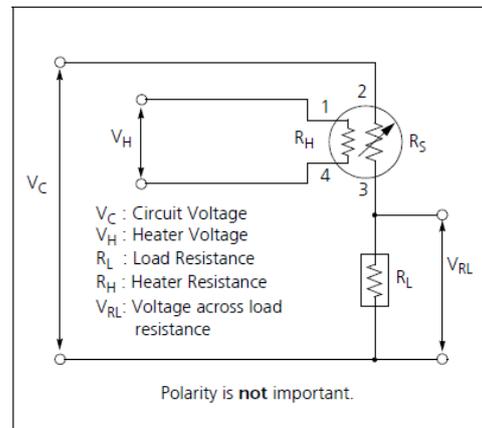


Fig 2. Standard circuit

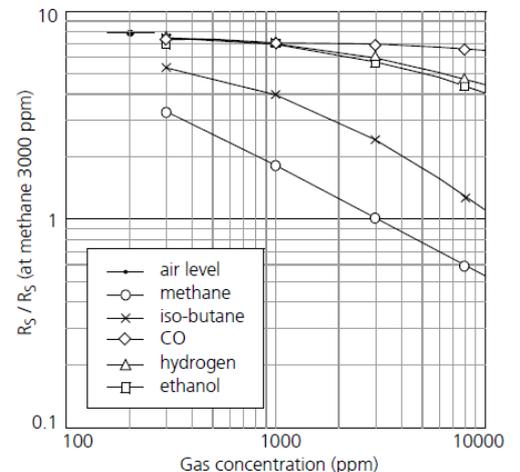


Fig 3. Sensitivity characteristics

Specifications: SP-12A-00

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH	Heater voltage	5.0 V ± 4%	AC or DC
VC	Circuit voltage	5.0 V ± 4%	AC or DC
RL	Load resistance	Variable	$P_s < 10 \text{ mW}$
RH	Heater resistance	$42\Omega \pm 2\Omega$	at room temperature
IH	Heater current	76 mA (Typical value)	$IH = VH / RH$
PH	Heater power consumption	380 mW (Typical value)	$PH = VH^2 / RH$
PS	Power dissipation of sensing element	Less than 15 mW	$P_s = \frac{(VC - VRL)^2}{R}$

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 us for details.	Absolute minimum level : more than 18%.

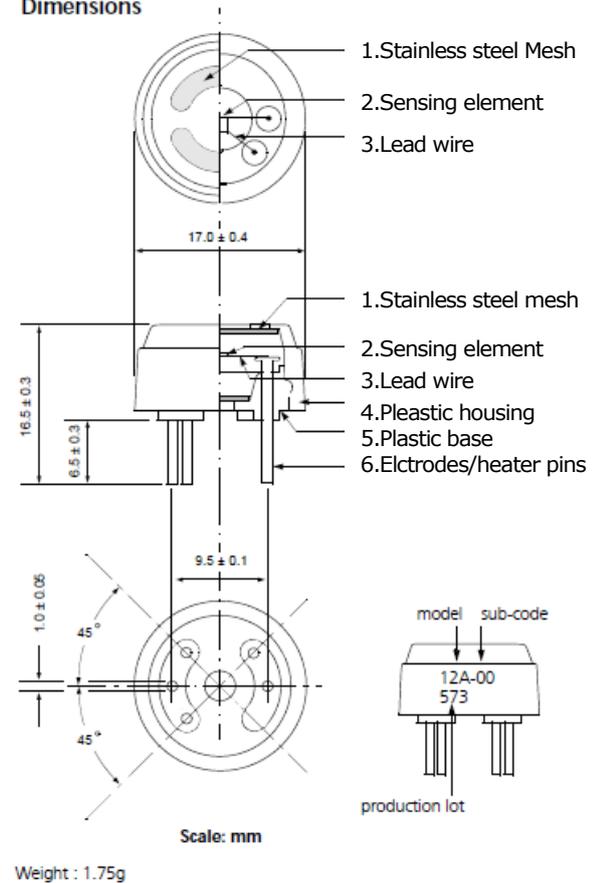
C. Sensitivity characteristics

Model	SP-12A-00		
Symbol	Parameter	Specification	Conditions etc.
R_s	Sensor resistance	4 k to 15 k Ω	At 5000 ppm of methane
β	Sensitivity slope	0.60 to 0.75	$\frac{R_s \text{ at CH}_4 \text{ 7000 ppm}}{R_s \text{ at CH}_4 \text{ 3000 ppm}}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air) Pre-heating time: more than 48 hours	VC: 5.0 ± 1% VH: 5.0 ± 1% RH: 10 k Ω ± 5%

D. Mechanical characteristics

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

Dimensions



E. Parts and Materials

No.	Parts	Materials
1	Stainless steel mesh	SUS 316 (100 mesh, double)
2	Sensing element	Tin dioxide (SnO ₂)
3	Lead wire	Gold alloy (Au-Pd-Mo)
4	Plastic housing	Nylon 46 (UL94HB)
5	Plastic base	Nylon 66 (UL94HB)
6	Heater/electrode pins	Nickel

Please contact

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Nissha FIS, Inc.
2-4-28, Tagawa
Yodogawa, Osaka
532-0027 Japan

Tel: +81 6-7176-3911
Fax: +81 6-7176-3912
<http://www.fisinc.co.jp>

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