FIS GAS SENSOR **SP-31** for SOLVENTS DETECTION (ALCOHOL, SOLVENTS)

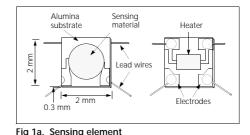
The SP-31 is a tin di-oxide semiconductor gas sensor which has a high sensitivity to solvents such as alcohol, toluene.

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

The circuit for the sensor is composed of two parts as shown in Fig 2. One part is for supplying heater voltage (V_H) and the other is for the output signal (V_c), which is current or voltage reflecting sensor resistance (R_s) change. The change of the sensor resistance is generally obtained as the change of the output voltage across the fixed or variable resistor (R_1) in series with the sensor resistance. In order to obtain the best performance and specified characteristics, the values of the heater voltage, circuit voltage and load resistance (R_1) must be within the range of values given in the standard operating conditions shown in the Specification table on the next page.



100 mesh SUS 316 gauze

(double)

Plastic housing

Plastic base Electrode and

heater pins

(Nickel)

Fig 1b. Configuration

Sensitivity characteristics

characteristics curves of the SP-31

Fig 3 shows the sensitivity

(typical data). Sensitivity

with an increase of gas

logarithmic function.

concentration based on a

characteristics of the FIS gas

sensors are expressed by the

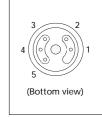
relationship between the sensor

The sensor resistance decreases

resistance and gas concentration.

100

Sensing element





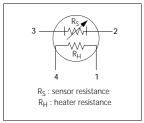
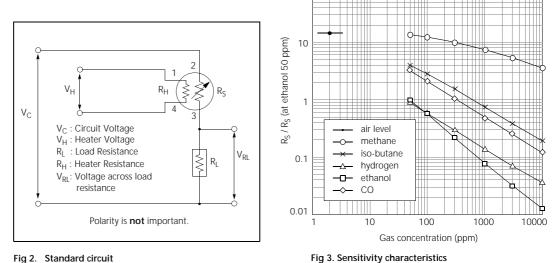


Fig 1d. Equivalent circuit

The sensitivity characteristics of the SP-31 are specified by the following parameters.

- Sensor resistance level: at ethanol 300 ppm
- Sensor resistance change ratio: between ethanol 50 ppm and 300 ppm

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



SPECIFICATIONS

Fig 2. Standard circuit

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Specifications

A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
V _H	Heater voltage	5.0 V ± 4 %	AC or DC
V _C	Circuit voltage	5.0 V ± 4%	AC or DC
RL	Load resistance	Variable	P _S < 15 mW
R _H	Heater resistance	56 Ω ± 2 Ω	at room temperature
P _H	Heater power consumption	315 mW (Typical value)	$P_{\rm H} = V_{\rm H}^2 / R_{\rm H}$
P _S	Power dissipation of sensing element	Less than 15 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 ₂)	Oxygen concentration	21% ± 1% (Standard condition)	Absolute minimum level: more than 18%
		The sensitivity characteristics are influenced by the variation in oxygen concentration.	

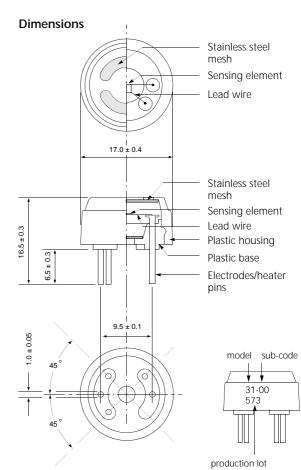
C. Sensitivity characteristics

Model	SP-31-00		
Symbol	Parameter	Specification	Conditions etc.
R _S	Sensor resistance	0.5 k Ω to 5.0 k Ω	At 300 ppm of ethanol/air
β	Ratio of sensor resistance	0.15 to 0.35	$\frac{R_{S} \text{ at 300 ppm of ethanol}}{R_{S} \text{ at 50 ppm of ethanol}}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air)	$\begin{array}{c} V_C: \ 10.0 \ V \pm 0.1 \ V \\ V_H: \ 5.0 \ V \pm 0.05 \ V \\ R_L: \ 3.9 \ k\Omega \pm 5\% \end{array}$
Pre-heating time: more than 48 hours			ore than 48 hours

D. Mechanical characteristics

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

Please contact



Scale: mm

Weight : 1.75g

E. Parts and Materials

No.	Parts	Materials
1	Sensing element	Tin dioxide (SnO ₂)
2	Substrate	Alumina (Al ₂ O ₃)
3	Lead wire	Noble metal alloy (Au-Pd-Mo)
4	Heater	Ruthenium oxide (RuO ₂)
5	Electrode	Gold (Au)
6	Plastic housing	Nylon 46 (UL94HB)
7	Plastic base	Nylon 66 (UL94HB)
8	Stainless steel mesh	SUS 316 (100 mesh, double)
9	Heater/electrode pins	Nickel

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