

SB-500-12

# FIS GAS SENSOR SB-500-12

## for CARBON MONOXIDE DETECTION

The SB-500-12 is a tin dioxide semiconductor gas sensor which has an excellent performance in CO detection. Using a mini-bead type sensing element with a periodic temperature change operation method, high sensitivity, selectively, small effect from humidity and other remarkable characteristics have been achieved. The SB-500-12 realizes the development of reliable CO detection 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. This sensor unit is placed in an external housing which contains active charcoal filter (Fig 1).

### Operating conditions

When the sensor is operated with high/low periodic operation (Fig 2), sensor signal changes according to the temperature dependency characteristics. By detecting the sensor signal at sufficient timings, selective detection of CO has been achieved. Fig 3 shows the standard operation circuit and Fig 4 shows the sensitivity characteristics of the SB-500-12.

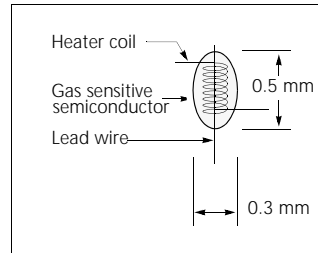


Fig 1a. Sensing element

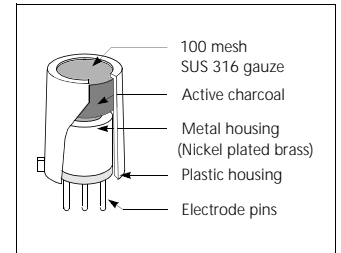


Fig 1b. Configuration

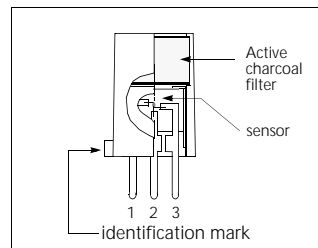


Fig 1c. Pin Layout

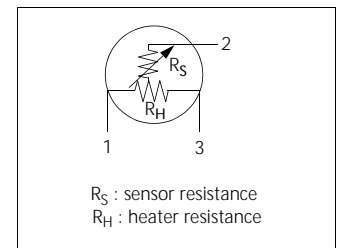


Fig 1d. Equivalent circuit

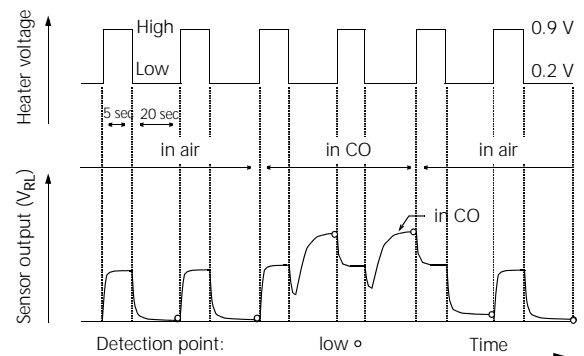


Fig 2 SB-500-12: Operating conditions and output signal

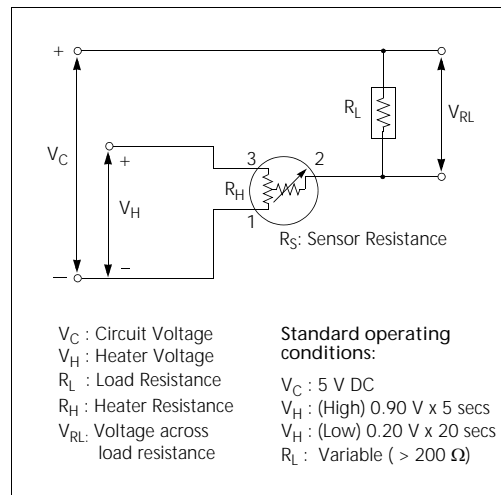


Fig 3. Standard circuit

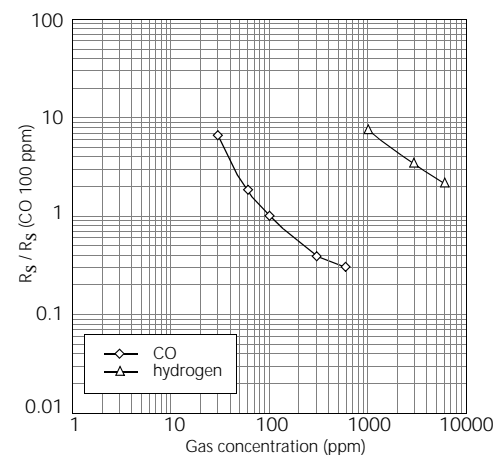


Fig 4. Sensitivity characteristics

**SPECIFICATIONS**

## SB-500-12

### Specifications

#### A. Standard Operating conditions

Symbol	Parameter	Specification	Conditions etc.
VH(H)	Heater voltage (high)	0.9 V ± 5%	AC, DC or pulse
VH(L)	Heater voltage (low)	0.2 V ± 5%	AC, DC or pulse
V <sub>C</sub>	Circuit voltage	Less than 5 V	DC: Pin2 (+) - Pin 1 (-)
R <sub>L</sub>	Load resistance	Variable (> 200 Ω)	P <sub>S</sub> < 10 mW
R <sub>H</sub>	Heater resistance	2.8 Ω ± 0.2 Ω	at room temperature
TH (H)	Heating time (high)	5 sec ± 0.1 sec	
TH (L)	Heating time (low)	20 sec ± 0.1 sec	
DT (L)	Detection timing (low)	< 0.1 sec	before switching to LOW
I <sub>S</sub> (H)	Current consumption (high)	132mA ± 15mA	VH=0.9V
I <sub>S</sub> (L)	Current consumption (low)	59mA ± 10mA	VH=0.2V
P <sub>S</sub>	Power dissipation	Less than 10 mW	

#### B. Environmental conditions

Symbol	Parameter	Specification	Conditions etc.
T <sub>ao</sub>	Operating temperature	-10 °C to 60 °C	Recommended range
T <sub>as</sub>	Storage temp.	-30 °C to 100 °C	
RH	Relative humidity	Less than 95% RH	
(O <sub>2</sub> )	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

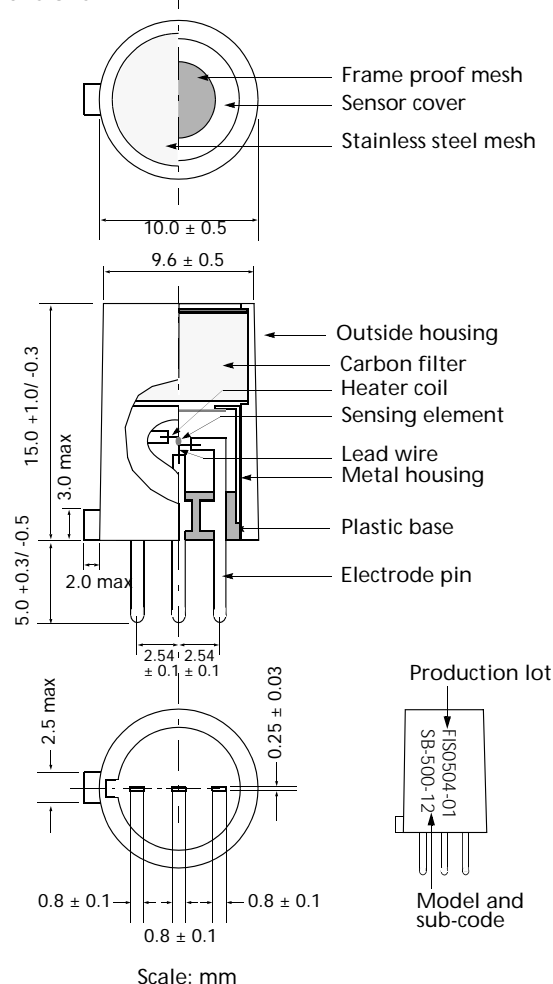
Model	SB-500-12		
Symbol	Parameter	Specification	Conditions etc.
R <sub>S</sub>	Sensor resistance	4.5 kΩ - 40 kΩ	at 100ppm of CO
α (30-100)	Sensitivity slope (30 - 100 ppm)	1.05 to 2.1	$\frac{\log(Rs(30 \text{ ppm}) / Rs(100\text{ppm}))}{\log(30/100)}$
α (100-300)	Sensitivity slope (100 - 300 ppm)	0.5 to 1.0	$\frac{\log(Rs(300 \text{ ppm}) / Rs(100\text{ppm}))}{\log(300/100)}$
Standard Test Conditions:		Temp: 20 °C ± 2 °C Humidity: 65% ± 5% (in clean air)	V <sub>C</sub> : 5.0 V ± 5% V <sub>H</sub> (high) : 0.9 V ± 5% V <sub>H</sub> (low) : 0.2 V ± 5% R <sub>L</sub> : 10 kΩ ± 1%
Pre-heating time: more than 4 days			

#### D. Mechanical characteristics

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

Should satisfy the specifications shown in the sensitivity characteristics after test.

#### Dimensions



#### E. Parts and Materials

No.	Parts	Materials
1.	Sensing element	Tin dioxide
2.	Heater coil / Lead wire	Platinum
3.	Stainless steel mesh	SUS 316 (100 mesh, single)
4.	Carbon filter	Activated carbon
5.	Outside housing	Nylon 6 (UL94 V-0)
6.	Flameproof mesh	SUS 316 (100 mesh, double)
7.	Metal cover	Nickel plated brass
8.	Plastic base	PBT (poly butylen telephthalate)
9.	Electrode pins	Iron-nickel alloy

Please contact

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