FIGARO

PRODUCT INFORMATION

TGS 842 - for the detection of Methane

Features:

* High sensitivity to Methane
* Long-term stability
* Low sensitivity to alcohol vapors
* Uses simple electrical circuit

Applications:

* Domestic gas alarms for the detection of methane
* Portable gas detectors

The sensing element of Figaro gas sensors is a tin dioxide (SnO_2) semiconductor which has low conductivity in clean air. In the presence of a detectable gas, the sensor's conductivity increases depending on the gas concentration in the air. A simple electrical circuit can convert the change in conductivity to an output signal which corresponds to the gas concentration.

The **TGS 842** has high sensitivity and selectivity to methane. Due to its low sensitivity to alcohol vapors and its low temperature/humidity dependency, the sensor can achieve good reproducibility, making it ideal for domestic gas alarms.

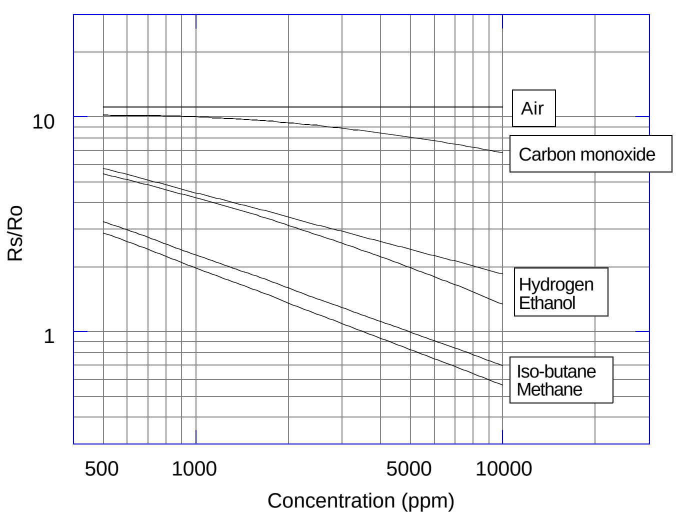
The figure below represents typical sensitivity char-acteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis is indicated as *sensor resistance ratio* (Rs/Ro) which is defined as follows:

Rs = Sensor resistance of displayed gases at various concentrations
Ro = Sensor resistance in 3500ppm methane

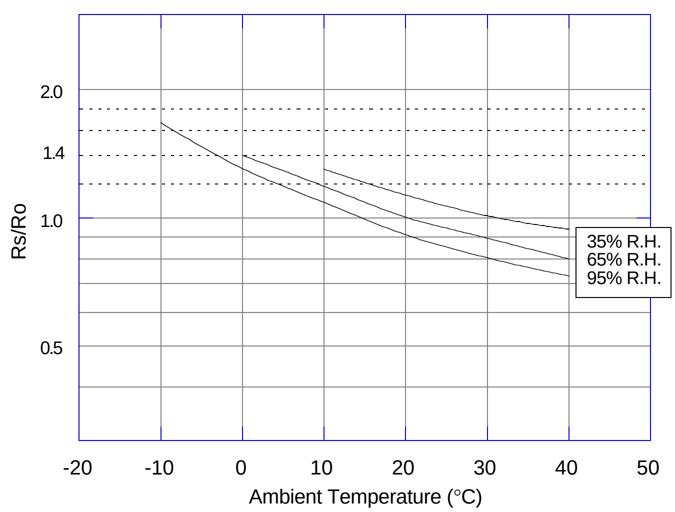
The figure below represents typical temperature and humidity dependency characteristics. Again, the Y-axis is indicated as *sensor resistance ratio* (Rs/Ro), defined as follows:

Rs = Sensor resistance at 3500ppm of methane at various temperatures/humidities
Ro = Sensor resistance at 3500ppm of methane at 20°C and 65% R.H.

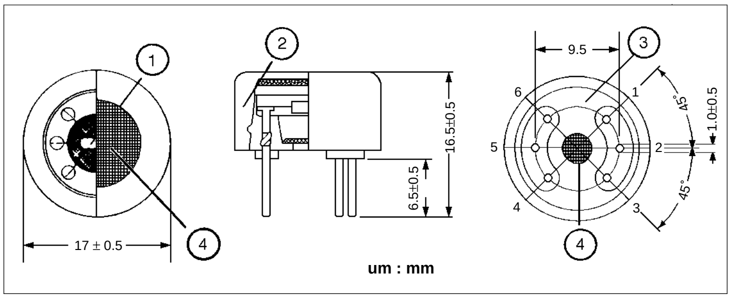
Sensitivity Characteristics:



Temperature/Humidity Dependency:



Structure and Dimensions:



① Sensing Element:
SnO_2 is sintered to form a thick film on the surface of an alumina ceramic tube which contains an internal heater.

② Cap:
Nylon 66

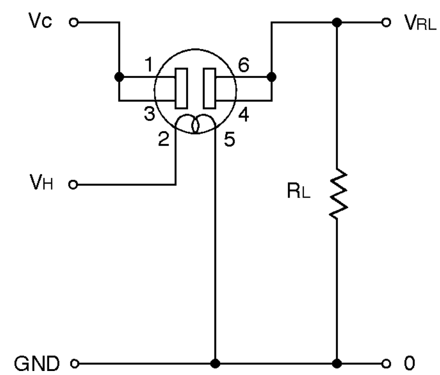
③ Sensor Base:
Nylon 66

④ Flame Arrestor:
100 mesh SUS 316 double gauze

Pin Connection and Basic Measuring Circuit:

The numbers shown around the sensor symbol in the circuit diagram at the right correspond with the pin numbers shown in the sensor's structure drawing (*above*). When the sensor is connected as shown in the basic circuit, output across the Load Resistor (V_{RL}) increases as the sensor's resistance (Rs) decreases, depending on gas concentration.

Basic Measuring Circuit:



Standard Circuit Conditions:

Item	Symbol	Rated Values	Remarks
Heater Voltage	V_H	5.0±0.2V	AC or DC
Circuit Voltage	V_C	Max. 24V	AC or DC *PS≤15mW
Load Resistance	R_L	Variable	*PS≤15mW

Electrical Characteristics:

Item	Symbol	Condition	Specification
Sensor Resistance	Rs	Methane at 1000ppm/air	3kΩ ~ 15kΩ
Change Ratio of Sensor Resistance	Rs/Ro	$\frac{\text{Rs (Methane at 3000ppm/air)}}{\text{Rs (Methane at 1000ppm/air)}}$	0.55 ± 0.05
Heater Resistance	R_H	Room temperature	30.0 ± 3.0Ω
Heater Power Consumption	P_H	V_H=5.0V	835 ± 90mW

Standard Test Conditions:

TGS 842 complies with the above electrical characteristics when the sensor is tested in standard conditions as specified below:

Test Gas Conditions: 20°±2°C, 65±5%R.H.
Circuit Conditions: V_C = 10.0±0.1V (AC or DC),
V_H = 5.0±0.05V (AC or DC),
R_L = 4.0kΩ±1%
Preheating period before testing: More than 7 days

Sensor Resistance (Rs) is calculated by the following formula:

$$Rs = \left(\frac{V_C}{V_{RL}} - 1\right) \times R_L$$

Power dissipation across sensor electrodes (Ps) is calculated by the following formula:

$$Ps = \frac{V_C^2 \times Rs}{(Rs + R_L)^2}$$

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