

# Hot Wire Type Semi-Conductor Method Sensor: SH

Stationary sensor  
Example: SH-8616



Portable sensor  
Example: SH-8641



## 1. Brief description

This sensor uses a metal oxide semiconductor, which changes in resistance when it comes into contact with a detectable gas. The sensor detects this change in resistance as the gas concentration. It is a high-sensitivity gas sensor for low concentrations.

Category	Detectable gas
Solid	Combustible Toxic

## 2. Structure and principles

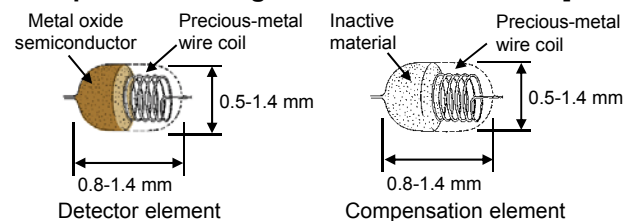
### [Structure]

The sensor consists of a detector element, which consists of a coil of a precious-metal (e.g., platinum) wire and a metal oxide semiconductor sintered on the coil, and a compensation element with a material inactive against detectable gases sintered on it.

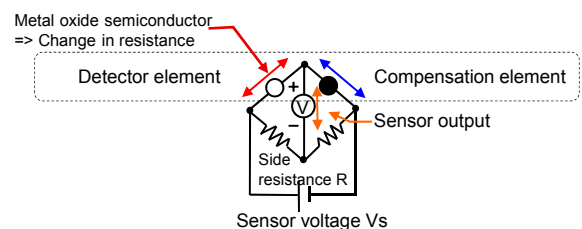
### [Principles]

The resistance ( $R$ ) of the detector element is the combined resistance of the resistance ( $R_S$ ) of the semiconductor and the resistance ( $R_H$ ) of the precious-metal wire coil. The detector element is heated  $300^{\circ}\text{C}$  to  $400^{\circ}\text{C}$  by the precious-metal wire coil and keeps a constant resistance. Then, methane gas or the like comes into contact with the detector element and separates the oxygen adsorbed on the surface of the metal oxide semiconductor. This increases the number of electrons that can freely move inside the semiconductor, reducing the resistance of the semiconductor. This results in the reduced resistance of the entire detector element. By allowing the bridge circuit to detect the change in resistance, the sensor determines the gas concentration.

### [Conceptual rendering of the sensor elements]



### [Bridge circuit]

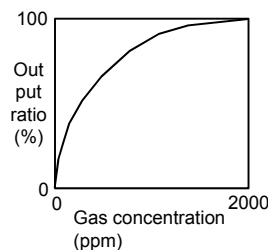


## 3. Features (of the sensor SH-8616 as an example)

### o Output characteristics

The sensor detects changes in the resistance of the semiconductor, meaning that it detects even low concentrations (ppm level) that cannot be detected by new ceramic-based sensors.

The sensor is highly sensitive with a high sensor output level for low concentrations.



### o Miniaturization and power saving

The precious-metal wire coil for the heater can be downsized to provide a smaller sensor that requires less power.

### o Gas selectivity

Adding an impurity to the metal oxide semiconductor changes the interference effect. This characteristic allows the sensor to selectively detect some gases.

### o Aging characteristics

The sensor maintains stability over the long term with a long life. Compared with the catalytic combustion-based sensor, this type sensor is highly resistant to toxicity and severe atmosphere.

## 4. Detectable gas, molecular formula, model, and detection range (examples)

Detectable gas	Molecular formula	Model #	Detection range
Hydrogen	$\text{H}_2$	SH-8612	0-2000 ppm
City gas	-	SH-8616	
Combustible gases in general	-	SH-8639	
		SH-8640	
		SH-8641	

## 5. Products of this type (examples)

### o Stationary products

... GD-A80S, GD-A80DS

### o Portable products

... SP-220, GX-2012GT

GX-2012GT

