Catalytic Combustion Method
Sensor: HW

Stationary sensor
Example: HW-6239

1. Brief description

This sensor detects gas based on heat generated by combustible gas burning on an oxidation catalyst. It is the most widely used gas sensor designed specifically for combustible gases.

Category	Detectable gas
Solid	Combustible

2. Structure and principles

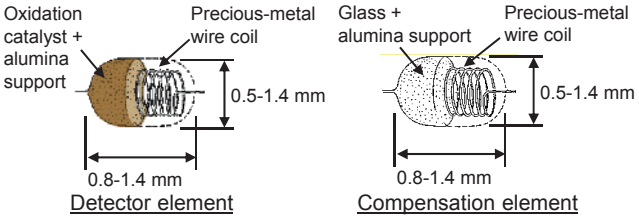
[Structure]

This sensor consists of a detector element and a compensation element. The detector element consists of a coil of a precious-metal (e.g., platinum) wire and an oxidant catalyst—a substance active against combustible gas—sintered on the coil along with an alumina support. The element burns in reaction to any detectable gas. The compensation element consists of a coil of a precious-metal wire and glass—a substance inactive against combustible gas—sintered on the coil along with an alumina support. This element corrects the effect of the atmosphere.

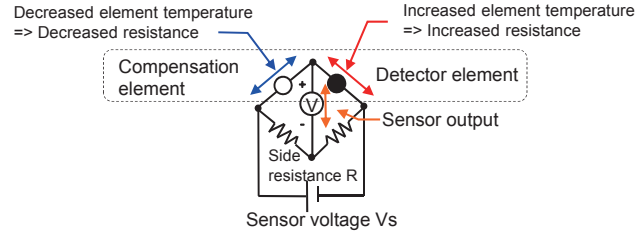
[Principles]

The precious-metal wire coil heats the detector element to 300℃ to 450℃. Then, a combustible gas burns on the surface of the detector element, increasing the temperature of the element. With changes in temperature, the precious-metal wire coil, a component of the element, changes in resistance. The resistance changes almost in proportion to the concentration of the gas. The bridge circuit shown in the right figure allows the sensor to recognize the change in resistance as the voltage to determine the concentration of the gas.

[Conceptual rendering of the sensor elements]



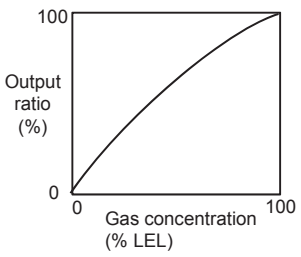
[Bridge circuit]



3. Features (of the sensor HW-6239 as an example)

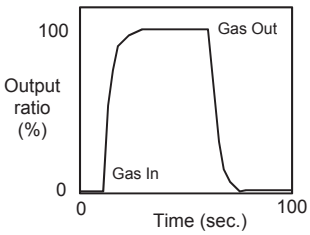
○ Output characteristics

The precious-metal wire coil, the heat source, linearly changes in temperature resistance coefficient. In the lower-explosion-limit (LEL) concentration region, the burning reaction is proportional to the gas concentration. In this region, the output from the sensor slowly changes according to the change in gas concentration.



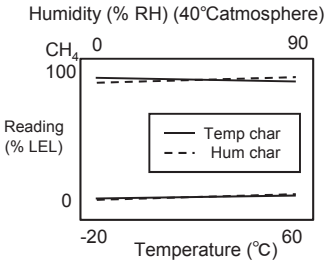
○ Responsiveness

The combustion heat produced on the surface of the detector element transfers to the precious-metal wire coil, changes the resistance of the bridge circuit, and then transforms into signals. With a high reaction rate, this sensor excels in responsiveness, accuracy, and reproducibility.



○ Temperature and humidity characteristics

The materials used in the elements have high electrical resistances and are less likely to be affected by the temperature and humidity in the use environment, allowing the reading to stay almost constant.



○ Catalyst development

The detector element uses a catalyst that promotes burning reaction. Having been developed in-house for gas sensors, this catalyst makes use of our proprietary know-how, providing long-term stability.

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

Detectable gas	Molecular formula	Model #	Detection range
Combustible gases in general	-	HW-6211	0-100% LEL
Methane	CH_4	HW-6239	
Vinyl chloride	C_2H_3Cl	HW-6214	
High-boiler gases	-	HW-6228	

5. Products of this type (examples)

○Stationary products

... GD-A80, GD-A80D, SD-1 (TYPE GP), SD-D58·DC (TYPE GP), SD-2500

○Portable products

... GP-1000

SD-1 (TYPE GP)