



Hydrogen Gas Sensor

(Model: MPv-820)

Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd

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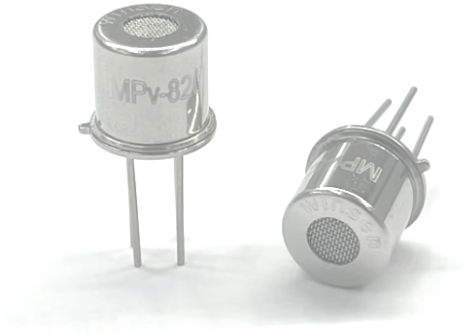
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Zhengzhou Winsen Electronics Technology CO., LTD

MPv-820 Hydrogen Gas Sensor

Profile

MPv-820 gas sensor is for hydrogen. It adopts multilayer thick film manufacturing technology. The heater and metal oxide semiconductor material on the ceramic substrate of subminiature Al_2O_3 are fetched out by electrode down-lead, encapsulated in metal socket and cap. Conductivity of the sensor is affected by the concentration of target gas. The higher the concentration is, the higher conductivity of sensor gets. Users can adopt simple circuit to convert variation of conductivity into output signal corresponding to gas concentration.



Features

High sensitivity, fast response speed, long service life, and simple application circuit

Main Application

Used for hydrogen leakage detection for energy vehicles and hydrogen storage stations

Basic Circuit

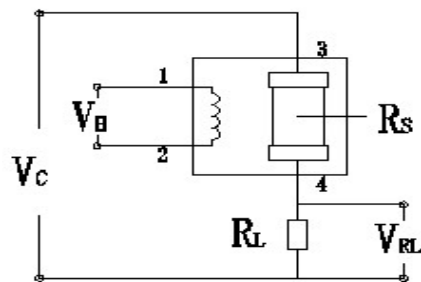
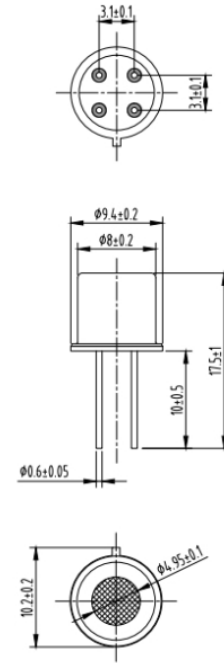


Fig2. MPv-820 Test Circuit

Instructions: The above fig is the basic test circuit of MP810. The sensor requires two voltage: heater voltage (V_H) and circuit voltage (V_C). The V_H supply specific working temperature for the sensor, it can use AC or DC. V_{RL} is the voltage of load resistance R_L which is in series with sensor; V_C supply power for Load resistance R_L . They must adopt DC power.

Model		MP820	
Sensor Type		Semiconductor flat surfaced sensor	
Standard Encapsulation		TO-5	
Detection Gas		H2	
Detection range		10-3000ppm	
Standard circuit	Loop voltage	V _C	5.0V ± 0.1V DC
	Heating voltage	V _H	5.0V ± 0.1V DC
	Load resistance	R _L	Adjustable
	Heating consumption	P _H	≤ 350mW
	Surface resistance	R _S	0.5K Ω ~ 10K Ω (in 200ppm H2)
Sensitivity(Rs)		0.2~0.6 (H2) Rs300ppm/Rs50ppm	
Standard condition of testing	Temperature, humidity	20°C ± 2°C ; 65% ± 5%RH	
	Standard test circuit	VC/VH :5.0V ± 0.1V	
	Warm-up time	7 days	



Unit:mm

Fig1.Sensor Structure

Formula

$$P_s = \frac{(V_C - V_{RL})^2}{R_S}$$

Pin Definition

- 1 Heater
- 2 Heater
- 3 Sensor electrodes (+)
- 4 Sensor electrodes (-)

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

Description of Sensor Characters

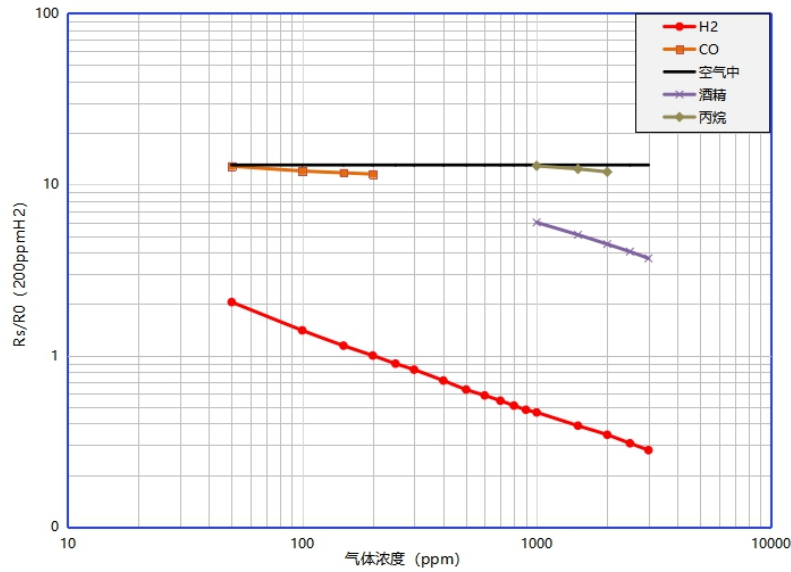
Sensitivity characteristics

The following figure shows the sensitivity characteristic curves of different gases measured under standard test conditions.

The vertical axis represents the sensor resistance ratio R_S/R₀, and R_S and R₀ are defined as follows:

R_S:the resistance of sensor in various gases

R₀:the resistance of sensors in 200ppm H2

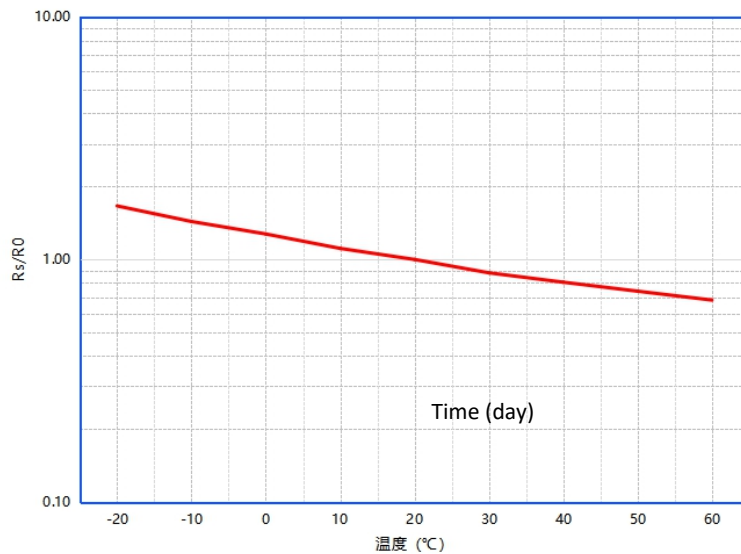


temperature characteristic

The following figure shows the characteristic curve of the sensor affected by temperature and humidity

The vertical axis represents the sensor resistance ratio R_s/R_0 , and R_s and R_0 are defined as follows:

The resistance value of R_s sensor in 200ppmH₂ under different temperature conditions, and the resistance value of R_0 in 200ppmH₂ under normal temperature conditions.



Cautions

1 .Following conditions must be prohibited

1.1 Exposed to volatilizable organic silicon steam

Sensing material will lose sensitivity and never recover if the sensor absorbs organic silicon steam. Sensors must avoid exposing to silicon bond, fixture, silicon latex, putty or plastic contain silicon environment.

1.2 High Corrosive gas

If the sensors are exposed to high concentration corrosive gas (such as H₂S, SO_x, Cl₂, HCl etc.), it will not only

result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

1.3 Alkali, Alkali metals salt, halogen pollution

The sensors performance will be changed badly if sensors be sprayed polluted by alkali metals salt especially brine, or be exposed to halogen such as fluorine.

1.4 Touch water

Sensitivity of the sensors will be reduced when splattered or dipped in water.

1.5 Freezing

Do avoid icing on sensor's surface, otherwise sensing material will be broken and lost sensitivity.

1.6 Applied higher voltage

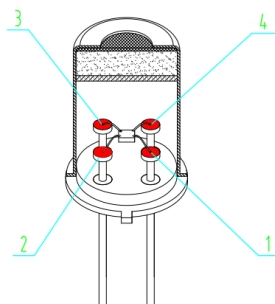
Applied voltage on sensor should not be higher than stipulated value, even if the sensor is not physically damaged or broken, it causes down-line or heater damaged, and bring on sensors' sensitivity characteristic changed badly.

1.7 Voltage on wrong pins

As Fig8, Pin 1 and Pin 2 connect to heater power supply, Pin 3 and Pin 4 connect to test power supply ground; The heater power and test power can use same power circuit but must satisfy the power supply.

Note: Please not the bulge, the two pins closed to is are heating pole.

Pins Schematic Diagram



1,2 are heating pole
3,4 are test pole

2 .Following conditions should be avoided

2.1 Water Condensation

Indoor conditions, slight water condensation will influence sensors' performance lightly. However, if water condensation on sensors surface and keep a certain period, sensors' sensitive will be decreased.

2.2 Used in high gas concentration

No matter the sensor is electrified or not, if it is placed in high gas concentration for long time, sensors characteristic will be affected. If lighter gas sprays the sensor, it will cause extremely damage.

2.3 Long time storage

The sensors resistance will drift reversibly if it's stored for long time without electrify, this drift is related with storage conditions. Sensors should be stored in airproof bag without volatile silicon compound. For the sensors with long time storage but no electrify, they need long galvanical aging time for stability before using. The suggested aging time as follow:

Table2.

Storage Time	Suggested aging time
Less than one month	No less than 48 hours

1 ~ 6 months	No less than 72 hours
More than six months	No less than 168 hours

2.4 Long time exposed to adverse environment

No matter the sensors electrified or not, if exposed to adverse environment for long time, such as high humidity, high temperature, or high pollution etc., it will influence the sensors' performance badly.

2.5 Vibration

Continual vibration will result in sensors down-lead response then break. In transportation or assembling line, pneumatic screwdriver/ultrasonic welding machine can lead this vibration.

2.6 Concussion

If sensors meet strong concussion, it may lead its lead wire disconnected.

2.7 Usage Conditions

2.7.1 For sensor, handmade welding is optimal way. The welding conditions as follow:

- Soldering flux: Rosin soldering flux contains least chlorine
- Homothermal soldering iron
- Temperature: $\leq 350^{\circ}\text{C}$
- Time: less than 3 seconds

If disobey the above using terms, sensors sensitivity will reduce.

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