Flammable Gas Sensor

（Model：MPn-4C）

Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd

Statement

Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &etc, please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD.

MPn-4C Flammable Gas Sensor

MPn-4C adopts a multi-layer thick film manufacturing process, which integrates a heating electrode, a measuring electrode and a metal oxide semiconductor gas sensitive layer on an Al2O3 ceramic substrate, and encapsulates it in a metal housing. When the detected gas is present in the ambient air, the conductivity of the sensor will change, and the higher the concentration of the gas, the higher the conductivity of the sensor. This change in conductivity can be converted into an output signal corresponding to the gas concentration using a simple circuit. The product has good anti-interference ability to common gases such as alcohol and acetic acid in the use scene.

Features:

*High sensitivity to CH4 gas
*Excellent anti-interference ability
*Excellent stability

Application

It is widely used in combustible gas leak monitoring devices, fire/safety detection systems for home, factory and commercial use; Flammable gas leak alarm, gas leak detector, etc.

Technical Parameters

Model			MPn-4C
Sensor Type			Flat surfaced
Standard Encapsulation			Metal cap
Target Gas			CH4, Nature gas, marsh gas
Detection range			300~10000ppm (methane, natural gas)
Standard Circuit Conditions	Loop Voltage	V_c	≤24V DC
	Heater Voltage	V_H	5V±0.1V AC or DC
	Load Resistance	R_L	Adjustable
	Heater consumption	P_H	≤350mW
	Sensitive resistance	R_S	1KΩ～20KΩ (in 4000ppm CH_4)
	Sensitivity	S	Rs(in air)/Rs(4000ppm CH_4)≥5
	Concentration Slope	α	≤0.6($R_{4000ppm}/R_{1000ppm}$ CH_4)
Standard test conditions	Temp. Humidity		20℃±2℃；55%±5%RH
	Standard test circuit		Vc: 5V±0.1V; V_H: 5V±0.1V
	Preheat time		Not less than 48 hours
	O2 content		21% (not less than 18%) O2 concentration effects initial value, sensitivity and repeatability.
Lifespan			10 years

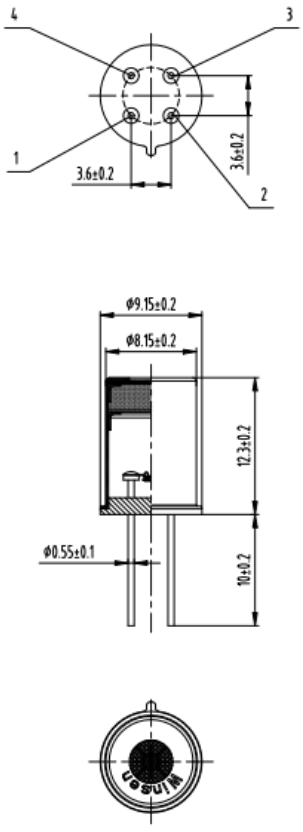


Fig1. Sensor structure

Basic circuit

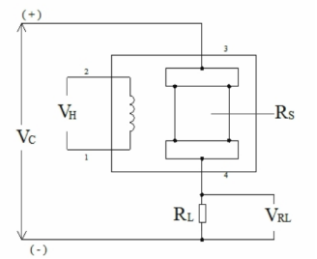


Fig2.Test circuit for MPn-4C

This circuit shows the basic measuring circuit of sensor. Two voltages should be applied to this sensor: heating voltage (V_H) and circuit voltage (Vc). V_H is used for supplying a certain temperature which can be DC or AC. V_{RL} is the voltage on the load resistance(RL) which connects to the sensor in series. Vc is supply the test voltage for RL and it must be DC.

Characterization

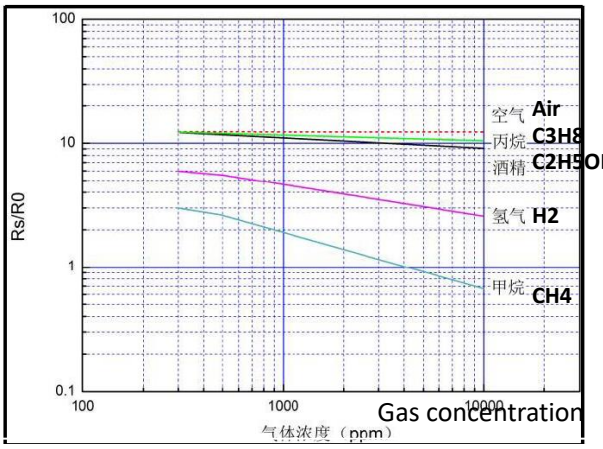


Fig3.Typical Sensitivity Curve

Rs means resistance in target gas with different concentration, R_0 means resistance of sensor in 4000ppm CH4 gas. All tests are finished under standard test conditions. In the figure, each gas feature point takes its value when it remains in the gas of a specific concentration for 60s.

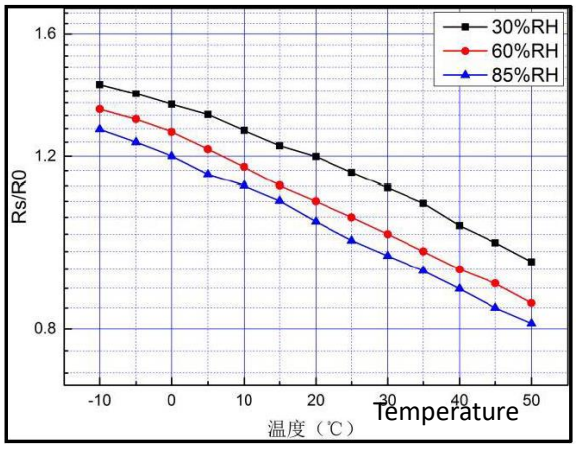


Fig4.Typical temperature/humidity characteristics

Rs means resistance of sensor in 4000ppm CH_4 gas, R_0 means resistance at 22℃, 55%RH. All tests are finished under standard test conditions.

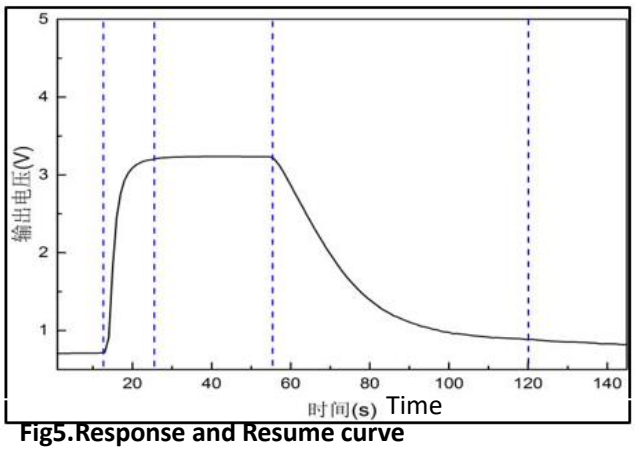


Fig5.Response and Resume curve

The ordinate is voltage output of RL which connects to sensor in series. The test is finished under standard test conditions and CH4 concentration is 4000ppm.

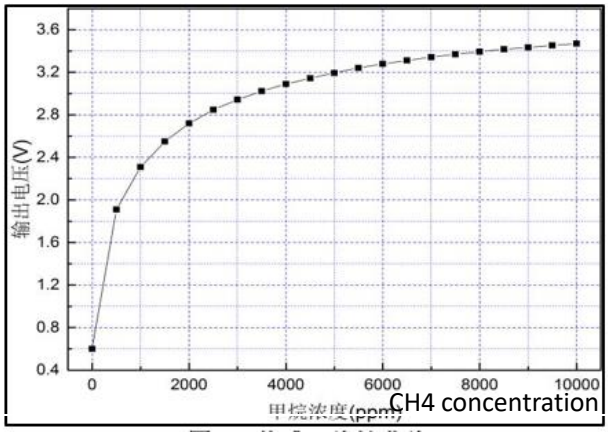
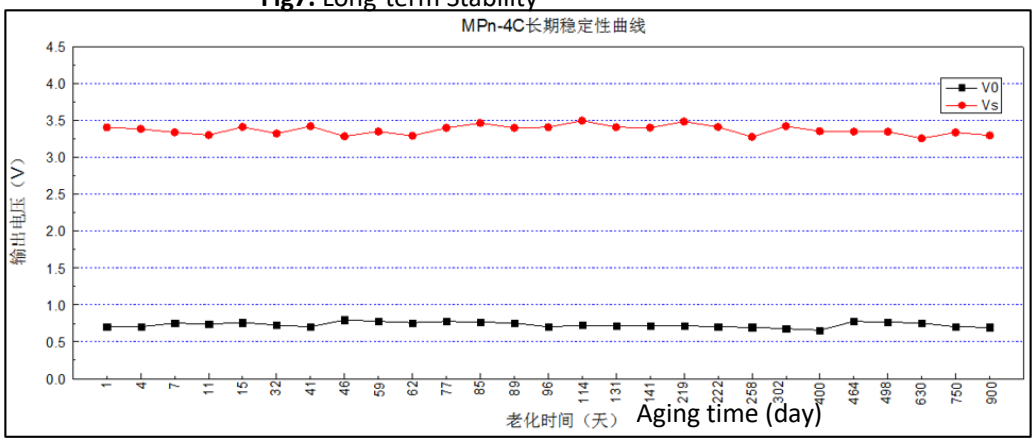


Fig6.Linear curve

The ordinate is voltage output of RL which connects to sensor in series. The test is finished under standard test conditions,

Long-term Stability

Fig7. Long-term Stability



NOTE: The output voltage in the figure is the voltage on the load resistance (RL) of the sensor in series, and the horizontal coordinate is the observation time. All the tests were done under standard conditions and measured methane concentrations of 4,000 PPM.

Cautions

1 .Following conditions must be prohibited

1.1 High Corrosive gas

If the sensors are exposed to high concentration corrosive gas (such as H_2S, SO_X, Cl_2, HCl etc.), it will not only result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

1.2 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.

1.3 Touch water

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

1.4 Freezing

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

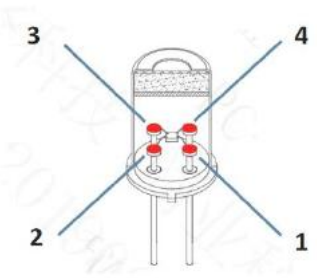
1.5 Applied higher voltage

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.

1.6 Voltage on wrong pins

As Fig8, Pin 1&2 connects to heater circuit, Pin 3&4 connects to measuring circuit; Under the requested conditions, heating and measuring can use the same power circuit.

NOTE: the two pins near the protuberance mark is heating electrode.



Pin 1&2 is heating electrode,
Pin 3&4 is measuring electrode.

Fig8.Pin Schematic Diagram

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.

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:

Stable2.

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 are strongly impacted or dropped, the lead wire will disconnected.

2.7 Usage Conditions

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

- Soldering flux: Rosin soldering flux contains least chlorine
- homothermal soldering iron
- Temperature： ≤350℃
- Time：less than 3 seconds

If disobey the above using terms, sensors sensitivity will be reduced.

Appendix. Information about the load resistance

Adjust the load resistance according to the following comparison table

Table3 Sensor No. and RL

No.	RL value
1#	1KΩ
2#	2KΩ
3#	3KΩ
4#	4.7KΩ
5#	6.8KΩ
6#	10KΩ
7#	20KΩ
8#	47KΩ
9#	100KΩ
10#	200KΩ

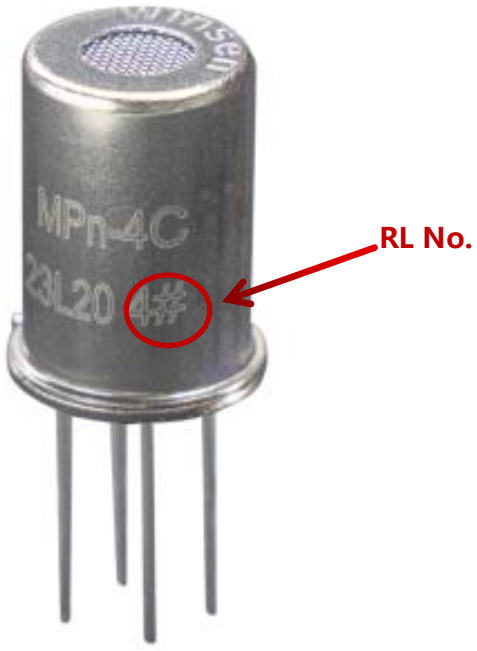


Fig9 Sensor RL No.

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