



# Hot-wire Type Gas Sensor

(Model: MR513)

# Manual

Zhengzhou Winsen Electronics Technology Co., Ltd

# Statement

This manual copyright belongs to Zhengzhou Winsen Electronics Technology Co., LTD. Without the written permission, any part of this manual shall not be copied, translated, stored in database or retrieval system, also can't spread through electronic, copying, record ways.

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

## MR513 Hot-wire Gas Sensor

### Overview

MR513 type gas sensor detect the gas concentration through resistance variation of platinum loop, which is based on the principle of the gas absorbed on the surface of metal oxide semiconductor, lead to the heat exchange and electricity exchange variation. It consists of detecting element and compensating element, which are the two legs of electric bridge. When exposing to the combustible gas, the resistance of detecting element reduces and the voltage variation of bridge output increase in direct proportion according to gas concentration. The compensating element performs for the reference and temperature compensation functions.

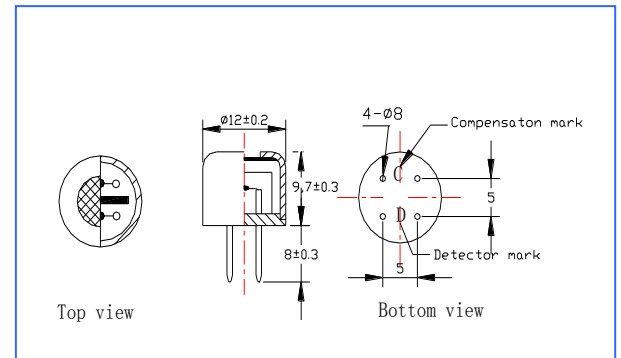


### Features Configuration

- \*High sensitivity, large signal output
- \*Short duration of initial stabilization, fast response.
- \*Good reproducibility and reliability
- \*Low consumption, miniature design

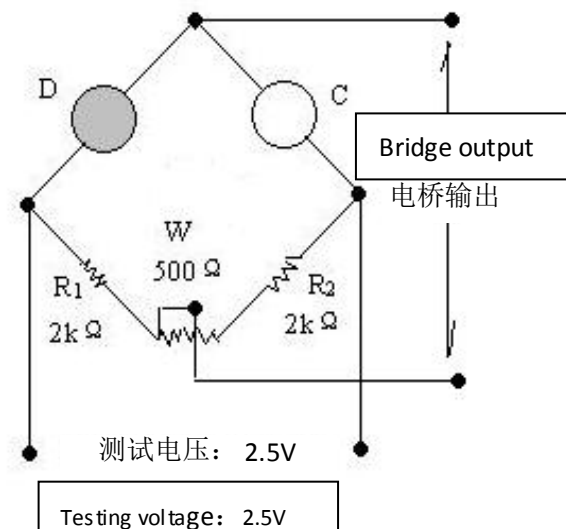
### Application

Portable alcohol detector and automotive ignition control system for domestic, industrial spot.

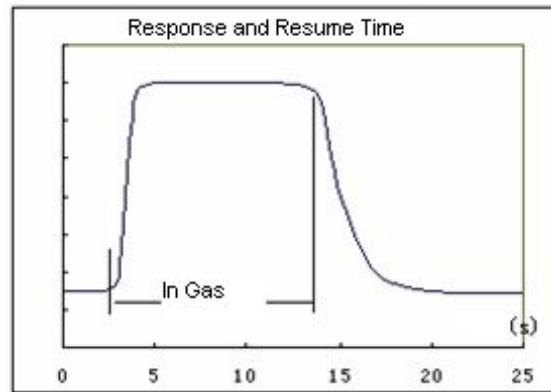
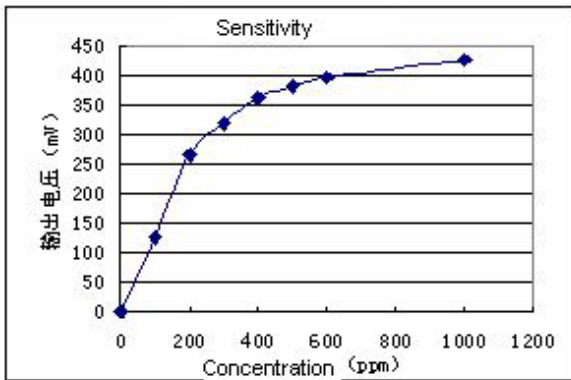


### Technical specification Basic testing circuit

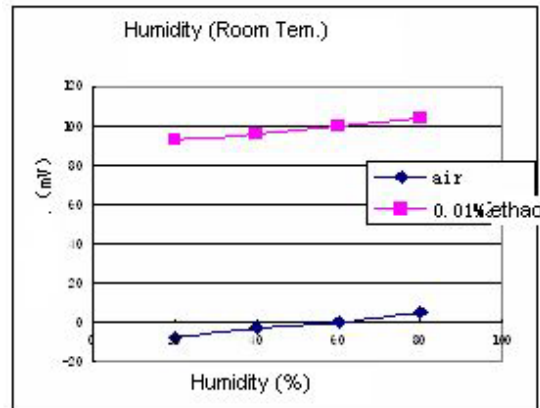
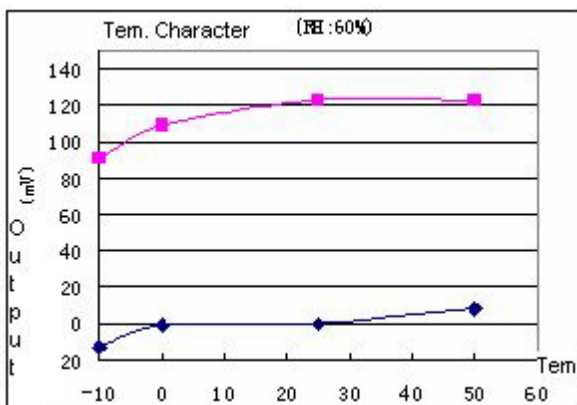
Model	MR513
Type	Hot-wire
Standard Encapsulation	Plastic Encapsulation
Working voltage(V)	2.5±0.1
Working current(mA)	≤100
Sensitivity(mV)	≥60(ethanol 100ppm)
Linearity (%)	0~5
Response time (90%)	≤20
Resume time (90%)	≤40
Using environment	-20—+50℃ under 95%RH
Storage environment	-20—+70℃ under 70%RH
Dimension (mm)	Φ12mm×10mm



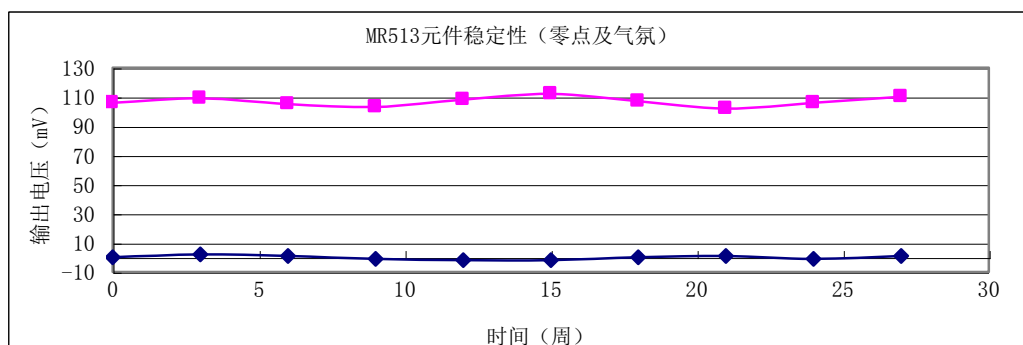
**The features of sensitivity, response and resume**



**The output signal varies with humidity and temperature**



**Long-term stability**



The drift in the air is less than 10mV per year, and the drift in the 0.01% ethanol is less than 10mV. It would cost 30 minutes aging for the stability of sensor according to short term storage (2 weeks), and cost 5 hours aging for the stability of sensor according to long-term storage (1 year).

**Note**

1 Following conditions must be avoided.

1.1 Exposed to organic silicon steam.

If organic silicon steam is adsorbed on the surface of sensor, sensitive material of sensor will be coated, which will restrain sensitivity of sensor and beyond retrieve. The sensor should avoid exposing to where existing of silicon adhesive, fixture, silicon latex, putty or other plastic additive contains silicon.

1.2 High corrosive gas environment

If the sensors exposed to high concentration corrosive gas (such as H<sub>2</sub>S, SO<sub>2</sub>, Cl<sub>2</sub>, HCl etc), it will not only result in corrosion of sensors structure, also it will make the sensitive materials changed irreversibly.

1.3 Alkali, Alkali metals salt, halogen pollution

The sensors performance will lead to deterioration if sensors are sprayed polluted by alkali metals salt especially brine, or exposed to halogen such as fluorine.

1.4 Exposed to the water

The sensitivity of sensor will be reduced when splattered or dipped in water.

1.5 Freezing

If icing up on surface of sensor, it will lead sensitive material disintegrate then lose sensitivity.

1.6 Applied voltage overhigh

If applied voltage on sensors or heater is higher than specified value, it will lead to wire lead and heater broken, and reduce its sensitivity, even if sensors have no physics damage.

2 Following conditions should be possibly avoided

2.1 Condensation water

Under indoor conditions, slight condensation water will effect performance of sensor lightly. However, if condensation water stays on the surface of sensor and keep a certain period, sensitivity of sensor will decrease.

2.2 Used in high gas concentration

No matter the sensor is electrified or not, if placed in high gas concentration for a long time, it will effect features of sensor.

2.3 Long time storage

If stored for long time without being electrified, the resistance of sensor produces reversible drift, which is related with storage conditions. Sensor should be stored in airproof without silicon gel bag with clean air. For the sensor with long time storage but no electrify, they need long aging time for stability before using.

2.4 Long time exposed to adverse environment

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

2.5 Vibration

Continual vibration will result in sensor down-lead resonance then rupture. 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

For sensors, handmade welding is optional way. If use wave crest welding should meet the following conditions:

2.7.1 Soldering flux: rosin soldering flux contains least chlorine.

2.7.2 Speed: 1-2 Meter/Minute

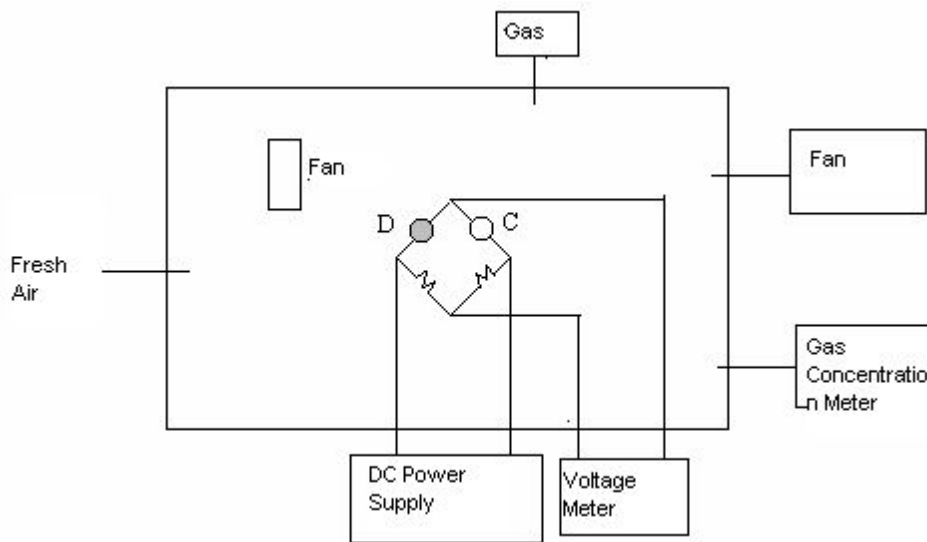
2.7.3 Warm-up temperature: 100±20°C

2.7.4 Welding temperature: 250±10°C

2.7.5 A single pass wave crest welding machine

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

### Attachment: testing for sensors



Tester:

A, Gas chamber: material of box is metal or glass, and not adsorb gas, the volume of box is more than 1 liter according to per pair sensor.

B, Test the gas concentration by infrared gas analyzer is recommended.

C, The gas inside the box should be stirred, but direct to the sensor unavailable. Airflow speed is lower than 0.5m/s.

D, Outside chamber is fresh gas.

E, Direct current regulated power supply. Impedance of milli-voltmeter is bigger than 100KΩ.

F, Before each test, use ventilator to change of air, each minutes amount of ventilation is bigger than 10 times of box cubage.

G, Sensors are built in the chamber, pose along horizontal direction. If changing the pose, it will cause different heat convection.

1, Gas concentration adjustment.

Gas concentration in chamber is adjusted by cubage way, using the formula below:

$$V(ml) = V1 \times C \times 10^{-6} \times (273 + TR) / (273 + TC)$$

V: inject gas cubage(ml), V1: chamber cubage(ml); C: gas concentration (ppm)

TR: room temperature(°C); TC: chamber temperature(°C).

2, Testing:

A, Aging: Before testing, use voltage rating to electrify more than 5 hours, if sensors are stored for long time, it should be aging more than 24 hours.

B, Testing: After presaging, measure its output voltage  $V_a$  in air. It will cost 1 min for injecting the testing gas into the chamber, which is diffused to the whole chamber. Measure the voltage of sensor  $V_g$  in the testing air. Gas sensitivity could shown as :

$$S=(V_g-V_a)/C.$$

C is gas concentration.

**Note: To keep continual product development, we reserve right to change design features without prior notice !**

**Zhengzhou Winsen Electronics Technology Co., Ltd**

**Add:** No.299, Jinsuo Road, National Hi-Tech Zone,  
Zhengzhou 450001 China

**Tel:** +86-371-67169097/67169670

**Fax:** +86-371-60932988

**E-mail:** [sales@winsensor.com](mailto:sales@winsensor.com)

**Website:** [www.winsen-sensor.com](http://www.winsen-sensor.com)