Winsen
炜盛科技

**Smell sensor**

**（Model：MQ316）**

# Manual

Version: 1.6

Valid from: 2021-7-1

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

# MQ316 Smell sensor

## Description

The gas-sensitive material used in the MQ316 odor sensor is a semiconductor material with low conductivity in clean air. When there is a gas to be measured in the environment where the sensor is located, the conductivity of the sensor increases as the concentration of the gas to be measured increases. Use a simple circuit to convert the change in conductivity into an output signal corresponding to the gas concentration .

## Features

This product has high sensitivity to ethanol, hydrogen sulfide, and methyl mercaptan in a wide concentration range, and has the advantages of long life, low cost, simple driving circuit, etc.

## Main Applications

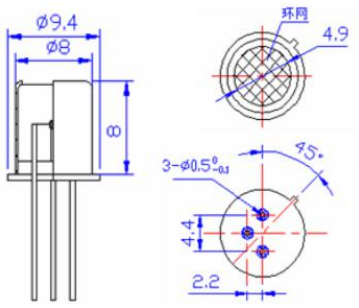
Widely used in breath odor detectors, portable alcohol detectors, etc.

## Technical Parameters

### Table 1

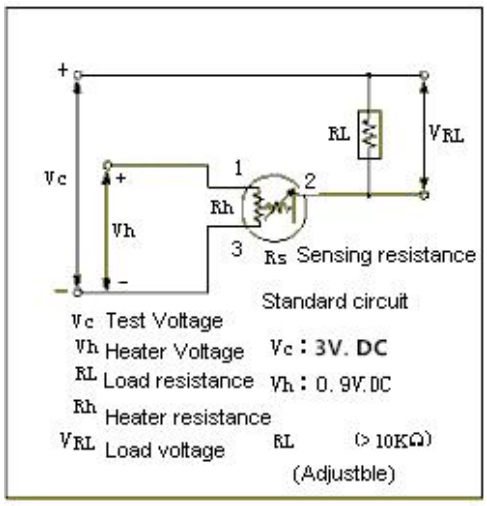
| | | | |
|---|---|---|---|
| Model | | | MQ316 |
| Sensor Type | | | Semiconductor |
| Standard Encapsulation | | | Metal |
| Target Gas | | | Ethanol, hydrogen sulfide, methyl mercaptan |
| Detection range | | | 5~ 200ppm ethanol |
| Standard Circuit Conditions | Loop Voltage | $V_H$ | 3.0V±0.1V DC |
| | Heater Voltage | $V_c$ | 0.9V±0.1V AC or DC |
| | Load Resistance | $R_L$ | Adjustable |
| Sensor character under standard test conditions | Heater Resistance | $R_H$ | 4.0Ω±0.5Ω（room temp.） |
| | Heater consumption | $P_H$ | ≤150mW |
| | Sensitivity | S | Rs(in air)/Rs(in 10ppm alcohol)≥2 |
| | Voltage output | $V_S$ | 1.0~3.0V (in 10ppm C2H5OH) |
| | Concentration Slope | α | ≤0.6($R_{50ppm}/R_{10ppm}$ C2H5OH ) |
| Standard test conditions | Tem. Humidity | | 20℃±2℃； 50%±10%RH |
| | Standard test circuit | | Vc:3.0V±0.1V DC<br>$V_H$: 0.9V±0.1V DC |
| | Preheat time | | Not less than 48 hours |

**Fig1.Sensor Structure (Unit: mm)**




The sensitive part of the gas sensor is a miniature sphere, Built-in heating wire and metal electrode, this kind of sensitive element Installed on double-layer 100 mesh stainless steel with explosion-proof function Inside the metal shell of the steel mesh.(Figure 1)

## Basic Test Circuit




Note: The above picture shows the basic test circuit of MQ316 sensor. The sensor needs to apply 2 voltages: heater voltage (VH) and test voltage (VC). Among them, VH is used to provide a specific working temperature for the sensor, and it can be DC or AC power. VRL is the load resistance (RL) of the sensor in series On the voltage. VC is the test voltage for the load resistance RL, and a DC power supply is required. It is necessary to apply 2.0±0.2V to the sensor for 5~10 seconds before normal detection The high voltage to make the sensor stabilize and enter the working state as soon as possible.

## Description of Sensor Characters

**Sensitivity curve**

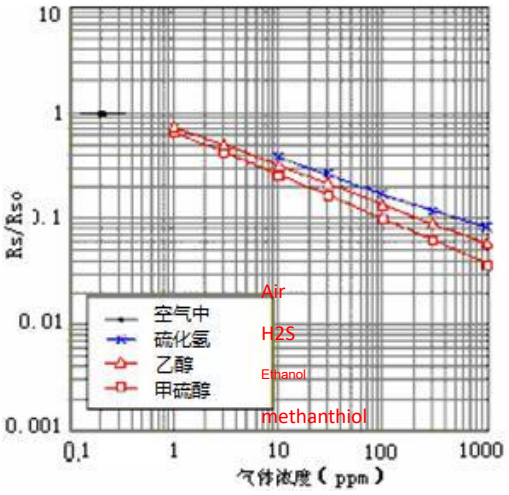



Figure 3 Component sensitivity characteristic curve The sensitivity characteristic graph reflects the difference between component resistance and gas concentration Relationship between. The resistance of the element is logarithmically related to the gas concentration System,

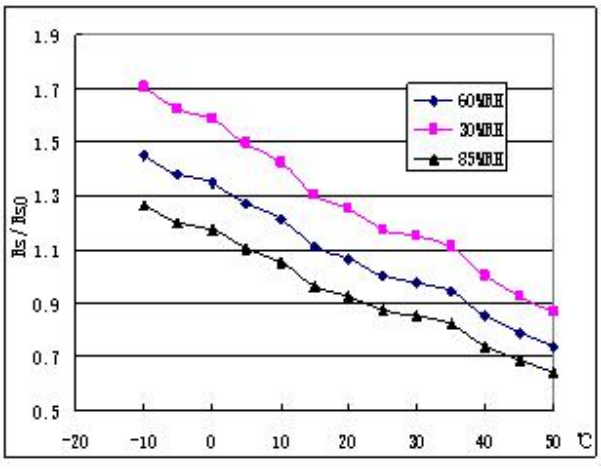



Figure 4 Typical temperature and humidity characteristic curve of the sensor The ordinate in the figure is the resistance ratio of the sensor (Rs/RS0). Rs means The resistance value of the sensor under different temperature/humidity with 50ppm ethanol. RS0 Indicates the sensor under 50ppm ethanol, 20℃/55%RH environmental conditions The resistance.

## Cautions

**1 .Following conditions must be prohibited**

1.1 Exposed to 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, fixature, 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 $H_2S$, $SO_X$, $Cl_2$, HCl etc.), it will not only result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

1.3 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 spattered 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.

**2 .Following conditions must 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:

**Table 2**

| Storage Time | Suggested aging time |
|---|---|
| Less than one month | Not less than 48 hours |
| 1 ~ 6 months | Not less than 72 hours |
| More than six months | Not 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

2.7.1For 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.

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