32507-MP

Research Kit of Gas Sensor Modules

Ideal for schools, research labs & experimenters. State of the art MQ-Series gas sensors coupled with a simple adjustable comparator circuit using a LM393 IC. Detects hazerdous/ combustable Vapors in the air. Simple 4 pin connections. Can be interfaced to an Arduino or other micro controllers. Freeware available through www.arduino.cc.en and other web sites.

Power: 5VDC

Outputs: TTL Compatible Digital & Sensor Direct Analog

4 Pin .1in. Pitch Header pins for Power & Output

LEDs for Output and Power status indication.

Response Time: <10Sec. Recovery Time: <30Sec.

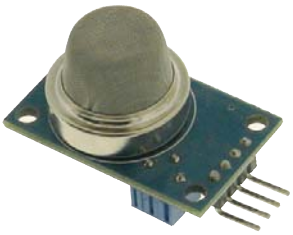
Enviromental: -10 to +45C, Humidity; <95%, <21% Oxygen

L: 1-1/4" **W:** 13/16" **H:** Varies by Sensor **WT:** .02

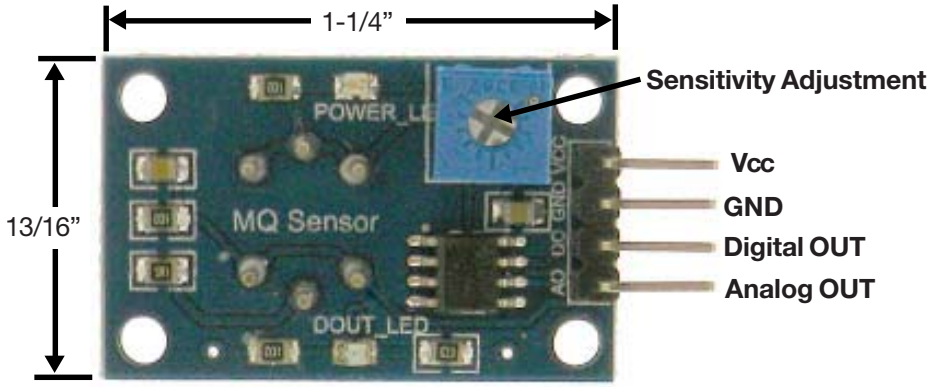
Lab Kit Includes

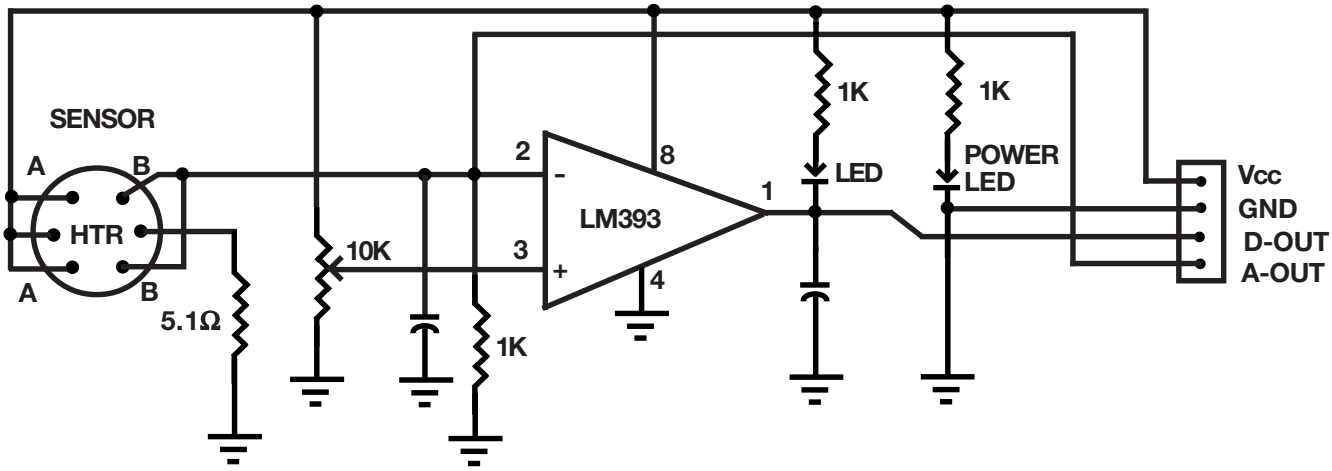
MQ-2 Combustable Gas Sensor
MQ-3 Ethanol Alcohol Sensor
MQ-4 Methane Gas Sensor
MQ-5 Natural Gas Sensor
MQ-6 Propane-Butane Sensor
MQ-7 Carbon Monoxide Sensor
MQ-8 Hydrogen Gas Sensor
MQ-9 Methane-Propane Sensor
MQ-135 Air Quality Sensor

MQ-3 & MQ-7



Others





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TECHNICAL DATA MQ-2 GAS SENSOR

FEATURES

Wide detecting scope — Fast response and High sensitivity
Stable and long life — Simple drive circuit

APPLICATION

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, i-butane, propane, methane ,alcohol, Hydrogen, smoke.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
Vc	Circuit voltage	5V±0.1	AC OR DC
V_H	Heating voltage	5V±0.1	ACOR DC
R_L	Load resistance	can adjust	
R_H	Heater resistance	33Ω ±5%	Room Tem
P_H	Heating consumption	less than 800mw	

B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-20℃-50℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Remarks
Rs	Sensing Resistance	3KΩ-30KΩ (1000ppm iso-butane)	Detecting concentration scope: 200ppm-5000ppm LPG and propane 300ppm-5000ppm butane 5000ppm-20000ppm methane 300ppm-5000ppm H_2 100ppm-2000ppm Alcohol
α (3000/1000) isobutane	Concentration Slope rate	≤0.6	
Standard Detecting Condition	Temp: 20℃±2℃ Humidity: 65%±5%	Vc:5V±0.1 Vh: 5V±0.1	
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

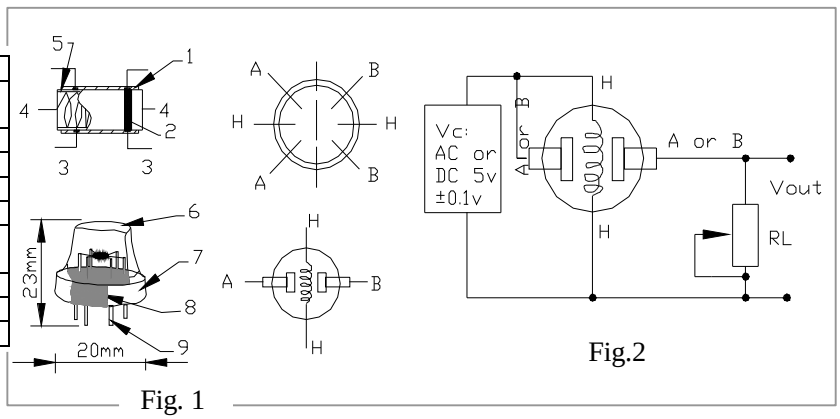
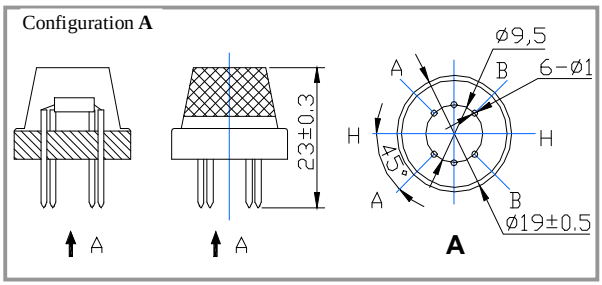
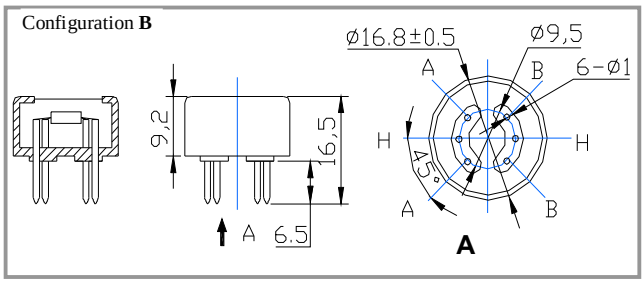


Fig. 1 Fig.2





Structure and configuration of MQ-2 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-2 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

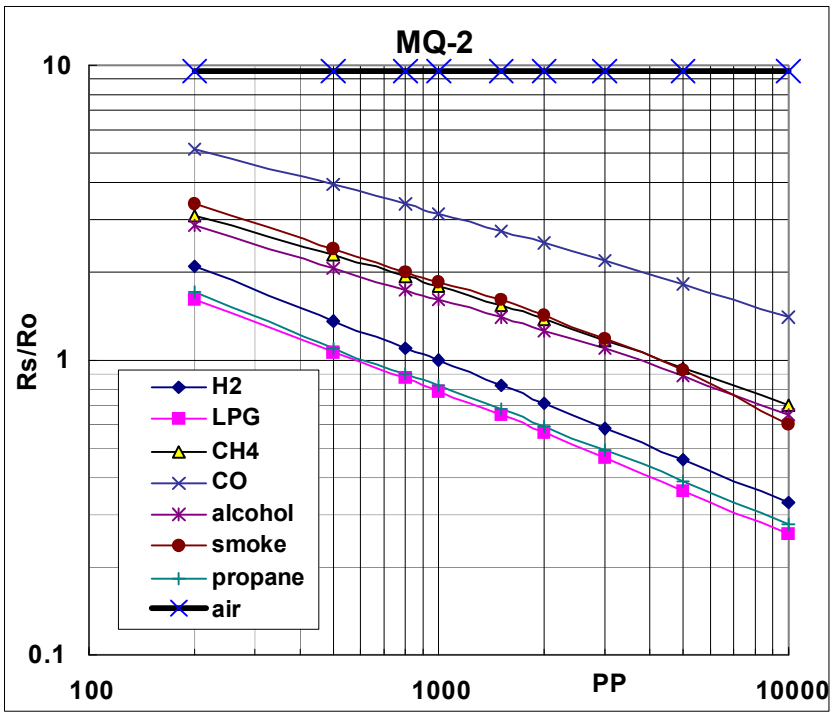


Fig.2 sensitivity characteristics of the MQ-2

Fig.3 is shows the typical sensitivity characteristics of the MQ-2 for several gases.
in their: Temp: 20℃、
Humidity: 65%、
O_2 concentration 21%
RL=5kΩ
Ro: sensor resistance at 1000ppm of H_2 in the clean air.
Rs:sensor resistance at various concentrations of gases.

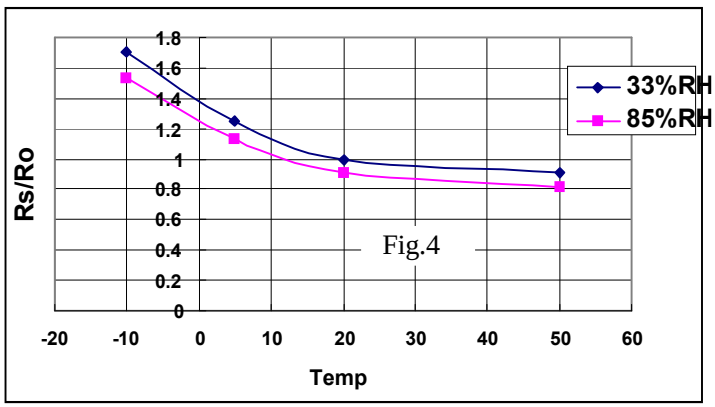


Fig.4

Fig.4 is shows the typical dependence of the MQ-2 on temperature and humidity.
Ro: sensor resistance at 1000ppm of H_2 in air at 33%RH and 20 degree.
Rs: sensor resistance at 1000ppm of H_2 at different temperatures and humidities.

SENSITVITY ADJUSTMENT

Resistance value of MQ-2 is difference to various kinds and various concentration gases. So,When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm liquified petroleum gas<LPG>,or 1000ppm iso-butane<i-C_4H_{10}>concentration in air and use value of Load resistance that(R_L) about 20 KΩ (5KΩ to 47 KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

Semiconductor Sensor for Alcohol

Sensitive material of MQ-3 gas sensor is SnO_2, which with lower conductivity in clean air. When the target alcohol gas exist, The sensor's conductivity is more higher along with the gas concentration rising. Please use simple electrocircuit, Convert change of conductivity to correspond output signal of gas concentration.

MQ-3 gas sensor has high sensitity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor. The sensor could be used to detect alcohol with different concentration, it is with low cost and suitable for different application.

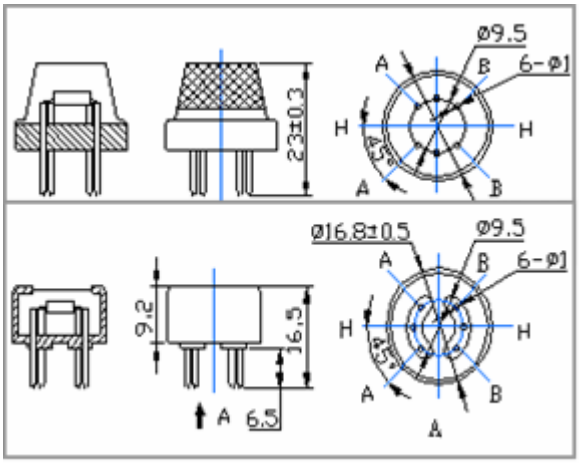
Character

* Good sensitivity to alcohol gas
* Long life and low cost
* Simple drive circuit

Application

* Vehicel alcohol detector
* Portable alcohol detector

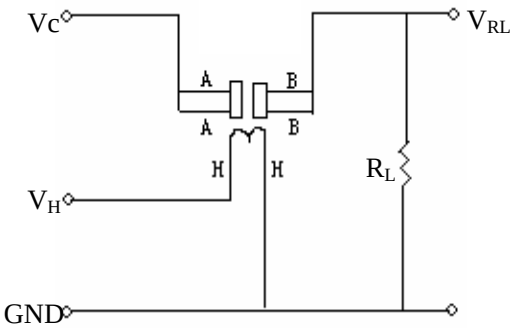
Configuration



Technical Data

Basic test loop

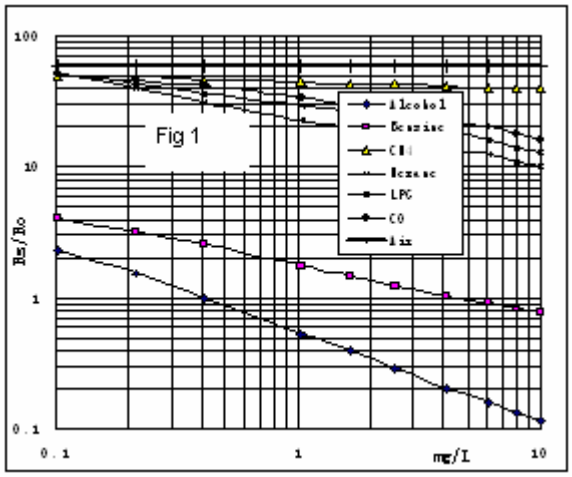
Model No.			MQ-3
Sensor Type			Semiconductor
Standard Encapsulation			Bakelite (Black Bakelite)
Detection Gas			Alcohol gas
Concentration			0.04-4mg/l alcohol
Circuit	Loop Voltage	V_c	≤24V DC
	Heater Voltage	V_H	5.0V±0.2V AC or DC
	Load Resistance	R_L	Adjustable
Character	Heater Resistance	R_H	31Ω±3Ω（Room Tem.）
	Heater consumption	P_H	≤900mW
	Sensing Resistance	R_s	2KΩ-20KΩ(in 0.4mg/l alcohol)
	Sensitivity	S	Rs(in air)/Rs(0.4mg/L Alcohol)≥5
	Slope	α	≤0.6(R_{300ppm}/R_{100ppm} Alcohol)
Condition	Tem. Humidity		20℃±2℃；65%±5%RH
	Standard test circuit		Vc:5.0V±0.1V； V_H: 5.0V±0.1V
	Preheat time		Over 48 hours



The above is basic test circuit of the sensor. The sensor need to be put 2 voltage, heater voltage (VH)and test voltage(VC). VH used to supply certified working temperature to the sensor, while VC used to detect voltage (VRL) on load resistance (RL) whom is in series with sensor. The sensor has light polarity, Vc need DC power. VC and VH could use same power circuit with precondition to assure performance of sensor. In order to make the sensor with better performance, suitable RL value is needed: Power of Sensitivity body(Ps): $Ps=Vc^2\times Rs/(Rs+RL)^2$

Resistance of sensor(Rs): Rs=(Vc/VRL-1)×RL

Sensitivity Characteristics



Influence of Temperature/Humidity

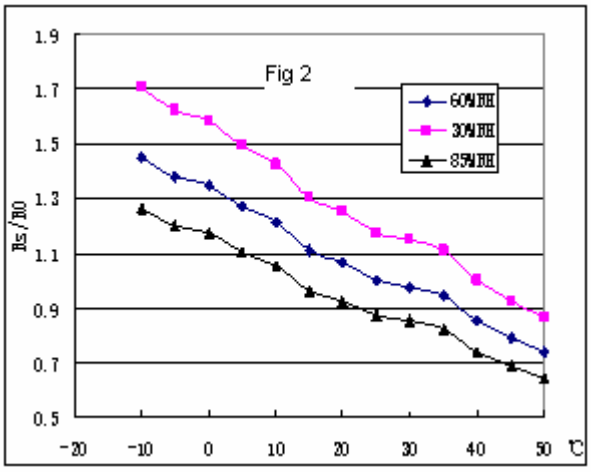
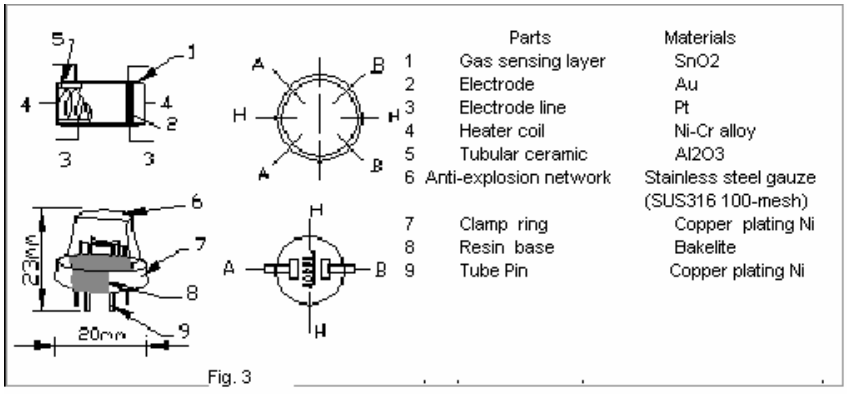


Fig.1 shows the typical sensitivity characteristics of the MQ-3, ordinate means resistance ratio of the sensor **(**Rs/Ro**),** abscissa is concentration of gases. Rs means resistance in different gases, Ro means resistance of sensor in 0. 4mg/l alcohol. All test are under standard test conditions.

P.S.: Sensitivity to smoke is ignite 10pcs cigarettes in $8m^3$ room, and the output equals to 0.1mg/l alcohol

Fig.2 shows the typical temperature and humidity characteristics. Ordinate means resistance ratio of the sensor (Rs/Ro), Rs means resistance of sensor in 0.4mg/l alcohol under different tem. and humidity. Ro means resistance of the sensor in environment of 0.4mg/l alcohol, 20°C/65%RH

Structure and configuration



	Parts	Materials
1	Gas sensing layer	SnO2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al2O3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

Fig. 3

Structure and configuration of MQ-3 gas sensor is shown as Fig. 3, sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-4 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current.

Notification

1 Following conditions must be prohibited

1.1 Exposed to organic silicon steam

Organic silicon steam cause sensors invalid, sensors must be avoid exposing to silicon bond, fixature, silicon latex, putty or plastic contain silicon environment

1.2 High Corrosive gas

If the sensors exposed to high concentration corrosive gas (such as H_2Sz, 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 fluorin.

1.4 Touch water

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

1.5 Freezing

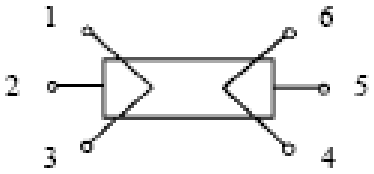
Do avoid icing on sensor'surface, otherwise sensor would lose sensitivity.

1.6 Applied voltage higher

Applied voltage on sensor should not be higher than stipulated value, otherwise it cause down-line or heater damaged, and bring on sensors' sensitivity characteristic changed badly.

1.7 Voltage on wrong pins

For 6 pins sensor, if apply voltage on 1, 3 pins or 4, 6 pins, it will make lead broken, and without signal when apply on 2, 4 pins



2 Following conditions must be avoided

2.1 Water Condensation

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

2.2 Used in high gas concentration

No matter the sensor is electrified or not, if long time placed in high gas concentration, if will affect sensors characteristic.

2.3 Long time storage

The sensors resistance produce reversible drift if it's stored for long time without electrify, this drift is related with storage conditions. Sensors should be stored in airproof without silicon gel bag with clean air. For the sensors with long time storage but no electrify, they need long aging time for stbility before using.

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 effect the sensors performance badly.

2.5 Vibration

Continual vibration will result in sensors down-lead response then repture. 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 sensor, handmade welding is optimal 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℃

2.7.4 Welding temperature：250±10℃

2.7.5 1 time pass wave crest solder machine

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

TECHNICAL DATA MQ-4 GAS SENSOR

FEATURES

* High sensitivity to CH_4， Natural gas.
* Small sensitivity to alcohol, smoke.
* Fast response . * Stable and long life * Simple drive circuit

APPLICATION

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of CH_4,Natural gas.LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
Vc	Circuit voltage	5V±0.1	AC OR DC
V_H	Heating voltage	5V±0.1	ACOR DC
P_L	Load resistance	20KΩ	
R_H	Heater resistance	33Ω ±5%	Room Tem
P_H	Heating consumption	less than 750mw	

B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-10℃-50℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Ramark 2
Rs	Sensing Resistance	10KΩ - 60KΩ (1000ppm CH_4)	Detecting concentration scope: 200-10000ppm CH_4 , natural gas
α (1000ppm/ 5000ppm CH_4)	Concentration slope rate	≤0.6	
Standard detecting condition	Temp: 20℃±2℃ Humidity: 65%±5%	Vc:5V±0.1 Vh: 5V±0.1	
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

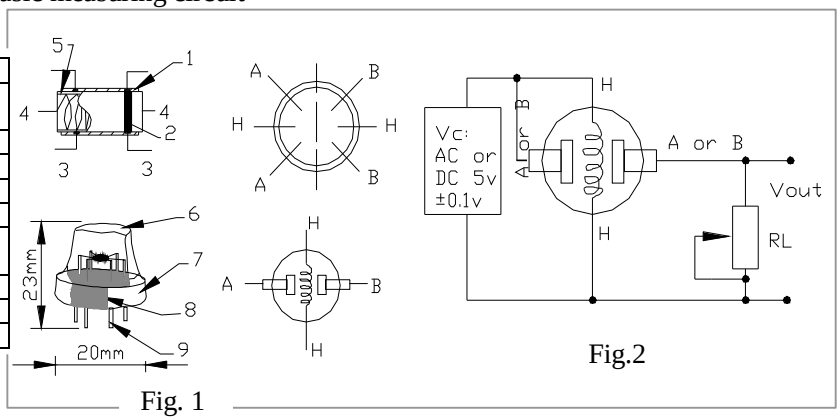
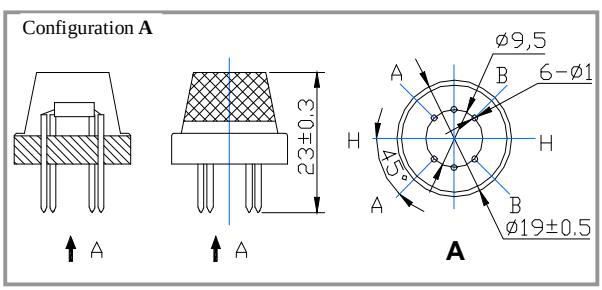
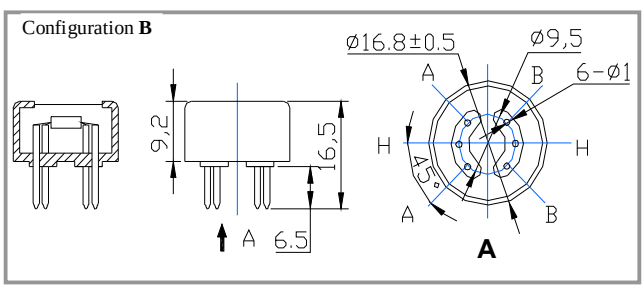


Fig. 1 Fig.2





Structure and configuration of MQ-4 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-4 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

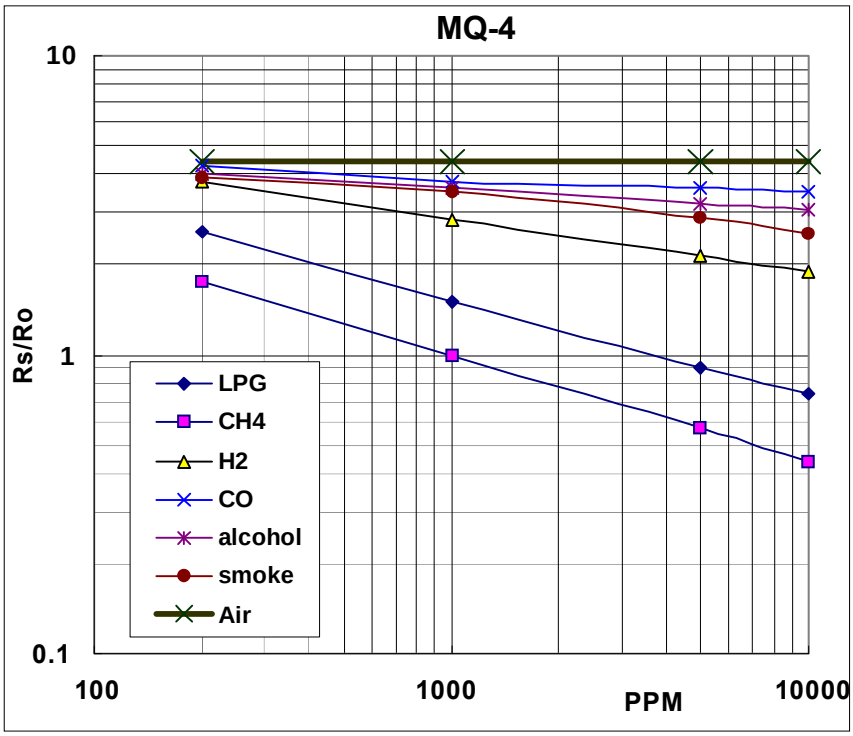


Fig.3 is shows the typical sensitivity characteristics of the MQ-4 for several gases.
in their: Temp: 20℃、
Humidity: 65%、
O_2 concentration 21%
RL=20kΩ
Ro: sensor resistance at 1000ppm of CH_4 in the clean air.
Rs:sensor resistance at various concentrations of gases.

Fig.2 sensitivity characteristics of the MQ-4

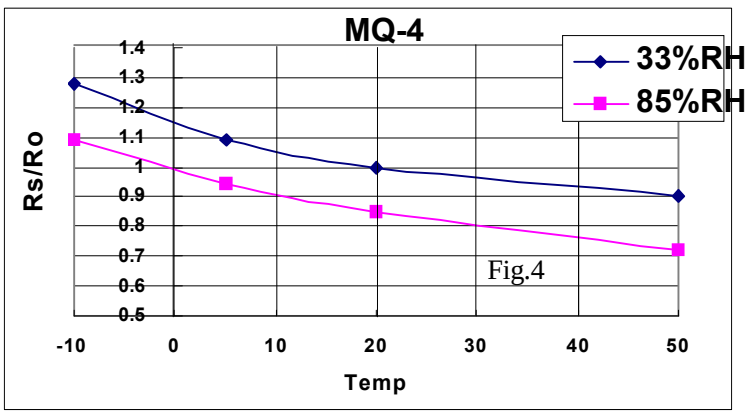


Fig.4 is shows the typical dependence of the MQ-4 on temperature and humidity.
Ro: sensor resistance at 1000ppm of CH_4 in air at 33%RH and 20 degree.
Rs: sensor resistance at 1000ppm of CH_4 in air at different temperatures and humidities.

SENSITVITY ADJUSTMENT

Resistance value of MQ-4 is difference to various kinds and various concentration gases. So,When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 5000ppm of CH_4 concentration in air and use value of Load resistance (R_L) about 20KΩ (10KΩ to 47KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

TECHNICAL DATA MQ-5 GAS SENSOR

FEATURES

* High sensitivity to LPG, natural gas , town gas
* Small sensitivity to alcohol, smoke.
* Fast response . * Stable and long life * Simple drive circuit

APPLICATION

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, natural gas , town gas, avoid the noise of alcohol and cooking fumes and cigarette smoke.

SPECIFICATIONS

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B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-10℃-50℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Remarks
Rs	Sensing Resistance	10KΩ - 60KΩ (5000ppm methane)	Detecting concentration scope: 200-10000ppm LPG,LNG Natural gas, iso-butane, propane Town gas
α (5000ppm/1000 ppm CH_4)	Concentration slope rate	≤0.6	
Standard detecting condition	Temp: 20℃±2℃ Humidity: 65%±5%	Vc:5V±0.1 Vh: 5V±0.1	
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
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6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
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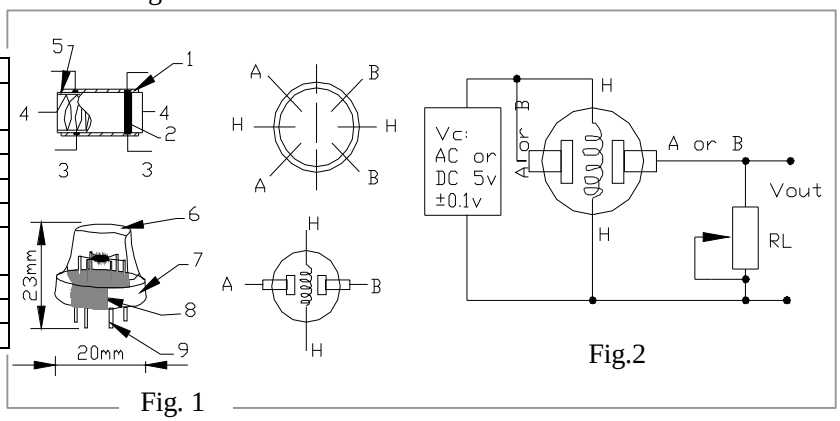
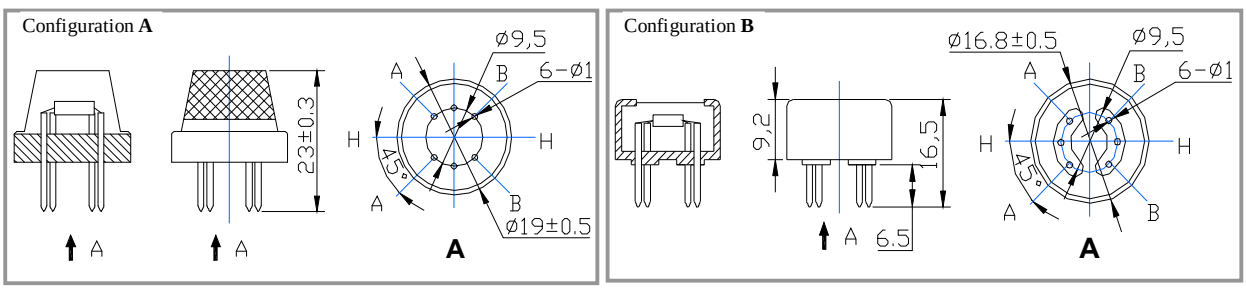


Fig. 1 Fig.2



Structure and configuration of MQ-5 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed byStructure and configuration of MQ-5 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed bymicro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-5 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

Fig.2 sensitivity characteristics of the MQ-5

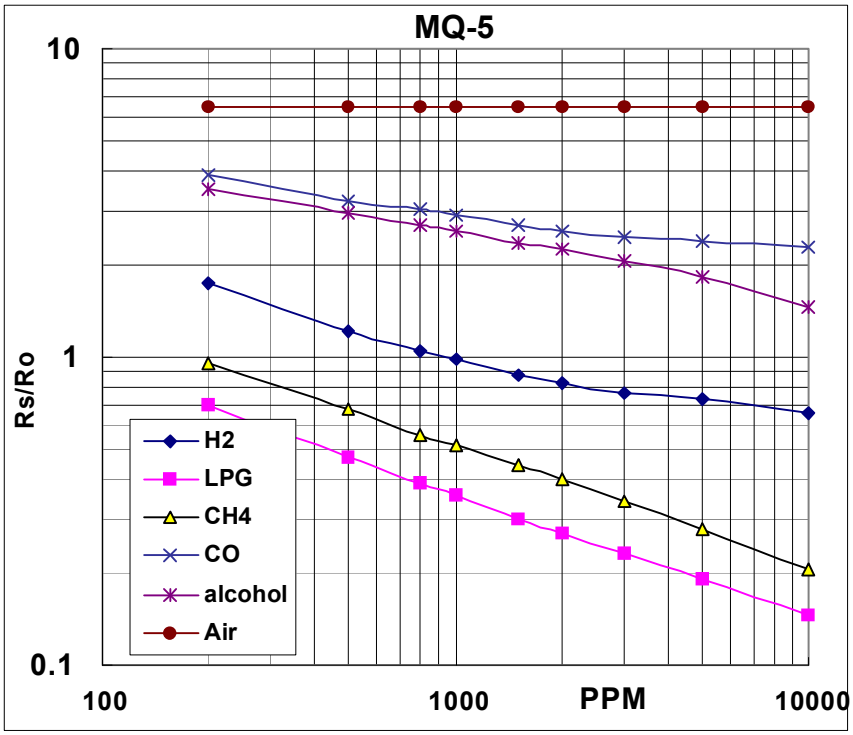


Fig.3 is shows the typical sensitivity characteristics of the MQ-5 for several gases.
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Humidity: 65%、
O_2 concentration 21%
RL=20kΩ
Ro: sensor resistance at 1000ppm of H_2 in the clean air.
Rs:sensor resistance at various concentrations of gases.

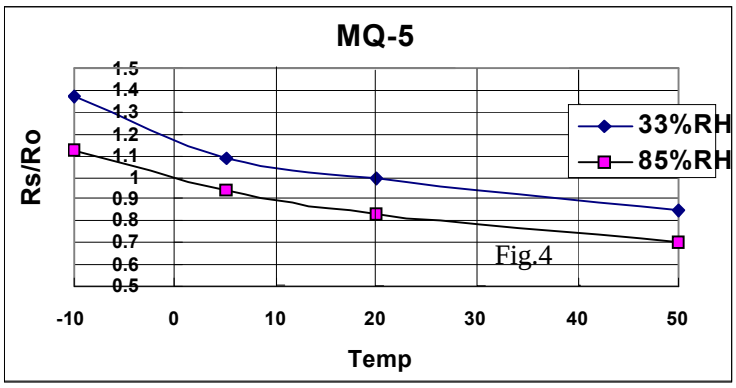


Fig.4

Fig.4 is shows the typical dependence of the MQ-5 on temperature and humidity.
Ro: sensor resistance at 1000ppm of H_2 in air at 33%RH and 20 degree.
Rs: sensor resistance at different temperatures and humidities.

SENSITVITY ADJUSTMENT

Resistance value of MQ-5 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm H_2 or LPG concentration in air and use value of Load resistance (R_L) about 20 KΩ (10KΩ to 47KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

TECHNICAL DATA MQ-6 GAS SENSOR

FEATURES

* High sensitivity to LPG, iso-butane, propane
* Small sensitivity to alcohol, smoke.
* Fast response . * Stable and long life * Simple drive circuit

APPLICATION

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
Vc	Circuit voltage	5V±0.1	AC OR DC
V_H	Heating voltage	5V±0.1	ACOR DC
P_L	Load resistance	20KΩ	
R_H	Heater resistance	33Ω ±5%	Room Tem
P_H	Heating consumption	less than 750mw	

B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-10℃-50℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Remarks
Rs	Sensing Resistance	10KΩ - 60KΩ (1000ppm LPG)	Detecting concentration scope: 200-10000ppm LPG , iso-butane, propane, LNG
α (1000ppm/ 4000ppm LPG)	Concentration slope rate	≤0.6	
Standard detecting condition	Temp: 20℃±2℃ Vc:5V±0.1 Humidity: 65%±5% Vh: 5V±0.1		
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

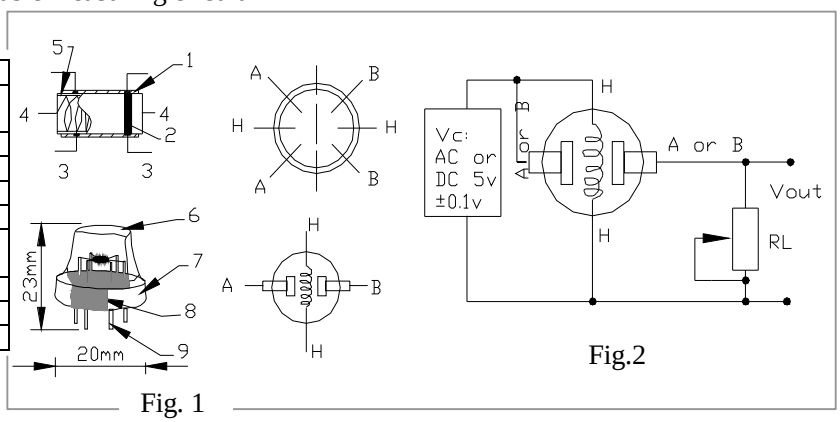
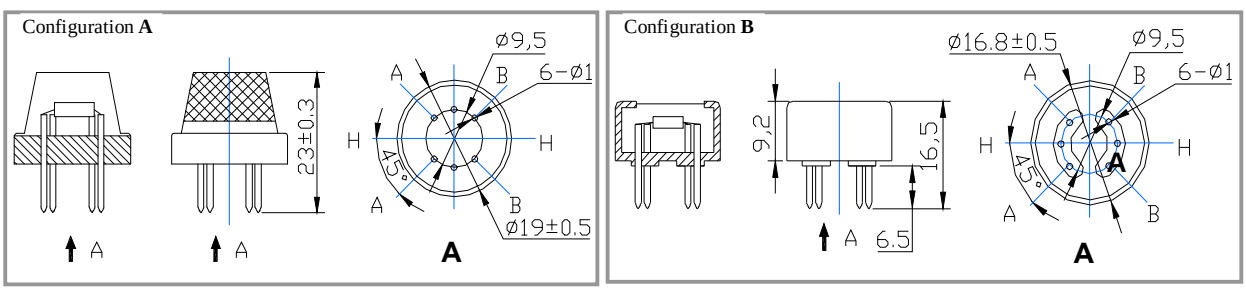


Fig. 1 Fig.2



Structure and configuration of MQ-6 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

Fig.2 sensitivity characteristics of the MQ-6

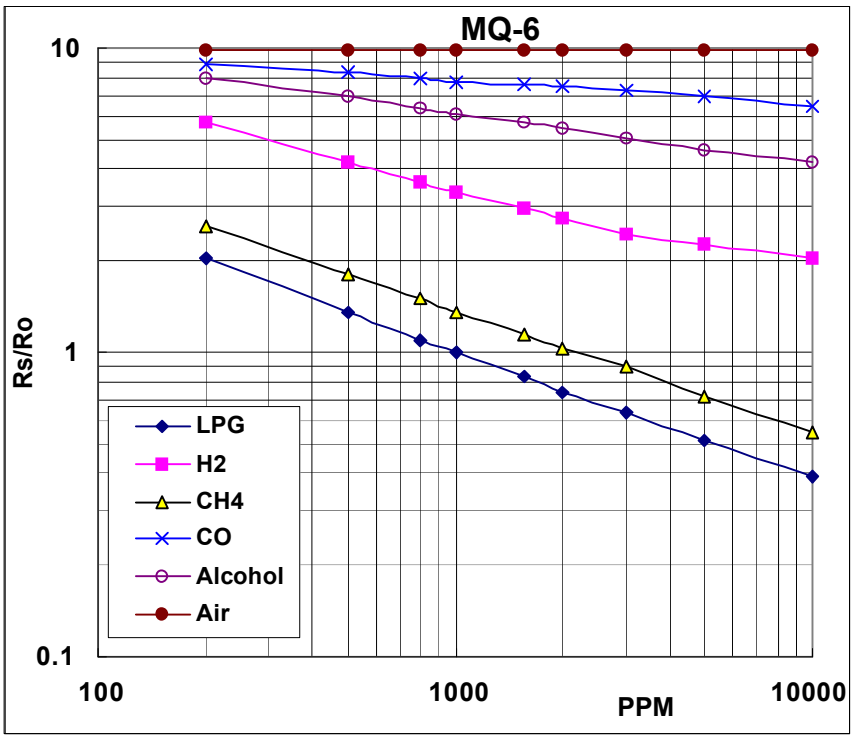


Fig.3 is shows the typical sensitivity characteristics of the MQ-6 for several gases.
in their: Temp: 20℃、
Humidity: 65%、
O_2 concentration 21%
RL=20kΩ
Ro: sensor resistance at 1000ppm of LPG in the clean air.
Rs:sensor resistance at various concentrations of gases.

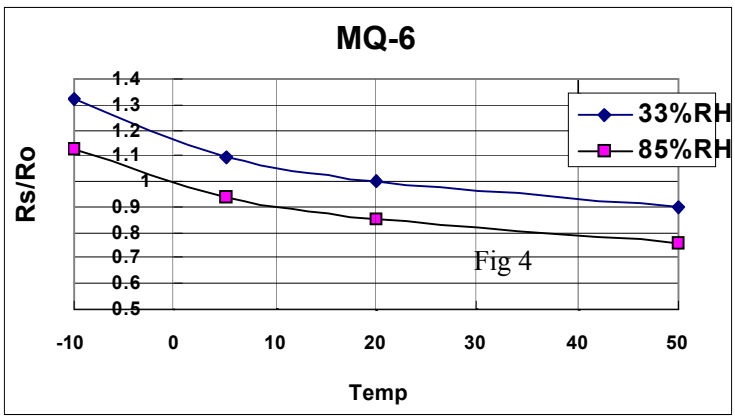


Fig 4

Fig.4 is shows the typical dependence of the MQ-6 on temperature and humidity.
Ro: sensor resistance at 1000ppm of LPG in air at 33%RH and 20 degree.
Rs: sensor resistance at 1000ppm of LPG in air at different temperatures and humidities.

SENSITVITY ADJUSTMENT

Resistance value of MQ-6 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm of LPG concentration in air and use value of Load resistance (R_L) about 20KΩ (10KΩ to 47KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

TECHNICAL DATA MQ-7 GAS SENSOR

FEATURES

* High sensitivity to carbon monoxide
* Stable and long life

APPLICATION

They are used in gas detecting equipment for carbon monoxide (CO) in family and industry or car.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remark
Vc	circuit voltage	5V±0.1	Ac or Dc
V_H (H)	Heating voltage (high)	5V±0.1	Ac or Dc
V_H (L)	Heating voltage (low)	1.4V±0.1	Ac or Dc
R_L	Load resistance	Can adjust	
R_H	Heating resistance	33Ω ±5%	Room temperature
$T_{H\,(H)}$	Heating time (high)	60±1 seconds	
$T_{H\,(L)}$	Heating time (low)	90±1 seconds	
PH	Heating consumption	About 350mW	

B. Environment conditions

Symbol	Parameters	Technical conditions	Remark
Tao	Using temperature	-20℃…+50℃	
Tas	Storage temperature	-20℃…+50℃	Advice using scope
RH	Relative humidity	Less than 95%RH	
O_2	Oxygen concentration	21%(stand condition) the oxygen concentration can affect the sensitivity characteristic	Minimum value is over 2%

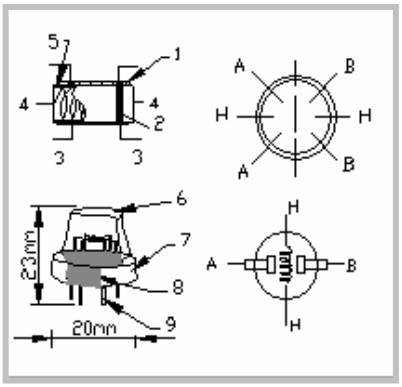
C. Sensitivity characteristic

symbol	Parameters	Technical parameters	Remark
Rs	Surface resistance Of sensitive body	2-20k	In 100ppm Carbon Monoxide
a (300/100ppm)	Concentration slope rate	Less than 0.5	Rs (300ppm)/Rs(100ppm)
Standard working condition	Temperature -20℃±2℃ relative humidity 65%±5% RL:10KΩ ±5%		
	Vc:5V±0.1V VH:5V±0.1V VH:1.4V±0.1V		
Preheat time	No less than 48 hours	Detecting range: 20ppm-2000ppm carbon monoxide	

D. Structure and configuration, basic measuring circuit

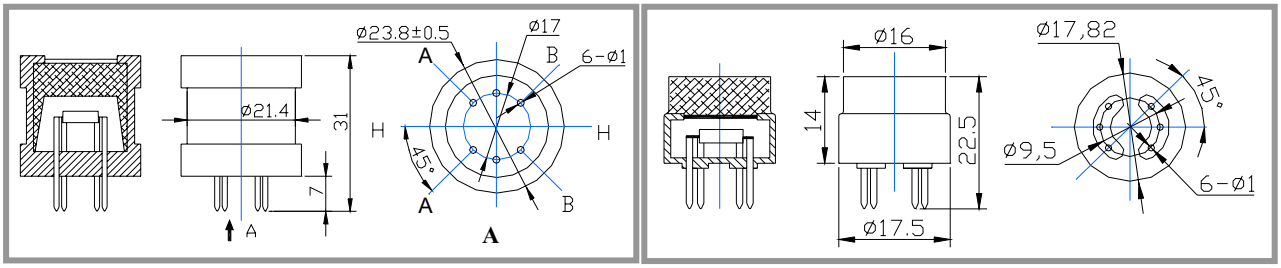
Structure and configuration of MQ-7 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-7 have 6 pins ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.



	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

Fig.1



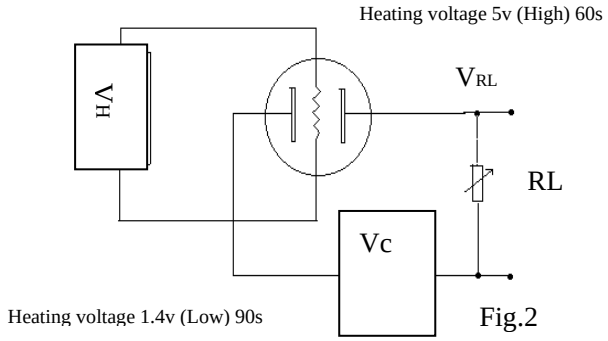


Fig.2

Standard circuit:

As shown in Fig 2, standard measuring circuit of MQ-7 sensitive components consists of 2 parts. one is heating circuit having time control function (the high voltage and the low voltage work circularly). The second is the signal output circuit, it can accurately respond changes of surface resistance of the sensor.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

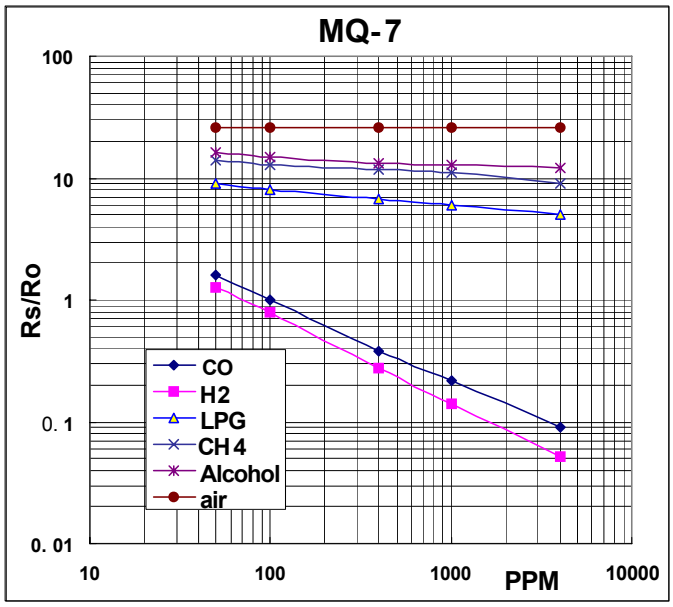


Fig.3 sensitivity characteristics of the MQ-7

Fig.3 is shows the typical sensitivity characteristics of the MQ-7 for several gases.

in their: Temp: 20℃、

Humidity: 65%、

O_2 concentration 21%

RL=10kΩ

Ro: sensor resistance at 100ppm CO in the clean air.

Rs: sensor resistance at various concentrations of gases.

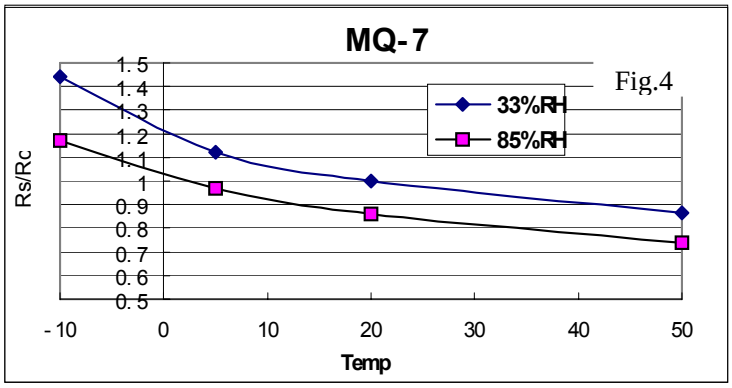


Fig.4

Fig.4 is shows the typical dependence of the MQ-7 on temperature and humidity.

Ro: sensor resistance at 100ppm CO in air at 33%RH and 20degree.

Rs: sensor resistance at 100ppm CO at different temperatures and humidities.

OPERATION PRINCIPLE

. The surface resistance of the sensor Rs is obtained through effected voltage signal output of the load resistance RL which series-wound. The relationship between them is described:

Rs\RL = (Vc-VRL) / VRL

Fig. 5 shows alterable situation of RL signal output measured by using Fig. 2 circuit output

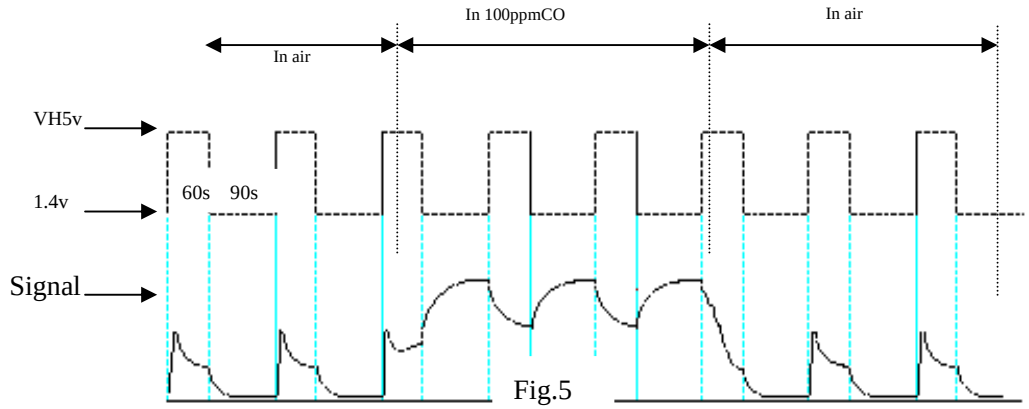


Fig.5

signal when the sensor is shifted from clean air to carbon monoxide (CO) , output signal measurement is made within one or two complete heating period (2.5 minute from high voltage to low voltage).

Sensitive layer of MQ-7 gas sensitive components is made of SnO_2 with stability, So, it has excellent long term stability. Its service life can reach 5 years under using condition.

SENSITVITY ADJUSTMENT

Resistance value of MQ-7 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 200ppm CO in air and use value of Load resistance that(R_L) about 10 KΩ (5KΩ to 47 KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence. The sensitivity adjusting program:

a. Connect the sensor to the application circuit.

b. Turn on the power, keep preheating through electricity over 48 hours.

c. Adjust the load resistance RL until you get a signal value which is respond to a certain carbon monoxide concentration at the end point of 90 seconds.

d. Adjust the another load resistance RL until you get a signal value which is respond to a CO concentration at the end point of 60 seconds .

TECHNICAL DATA MQ-8 GAS SENSOR

FEATURES

* High sensitivity to Hydrogen (H_2)
* Small sensitivity to alcohol, LPG,cooking fumes
* Stable and long life

APPLICATION

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of Hydrogen (H_2), avoid the noise of alcohol and cooking fumes, LPG,CO.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
Vc	Circuit voltage	5V±0.1	AC OR DC
V_H	Heating voltage	5V±0.1	ACOR DC
P_L	Load resistance	10K Ω	
R_H	Heater resistance	31±5%	Room Tem
P_H	Heating consumption	less than800mW	

B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-10℃-50℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Ramark 2
Rs	Sensing Resistance	10K Ω - 60K Ω (1000ppm H_2)	Detecting concentration scope: 100-10000ppm Hydrogen (H_2)
α (1000ppm/ 500ppmH_2)	Concentration slope rate	≤0.6	
Standard detecting condition	Temp: 20℃±2℃ Humidity: 65%±5%	Vc:5V±0.1 Vh: 5V±0.1	
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

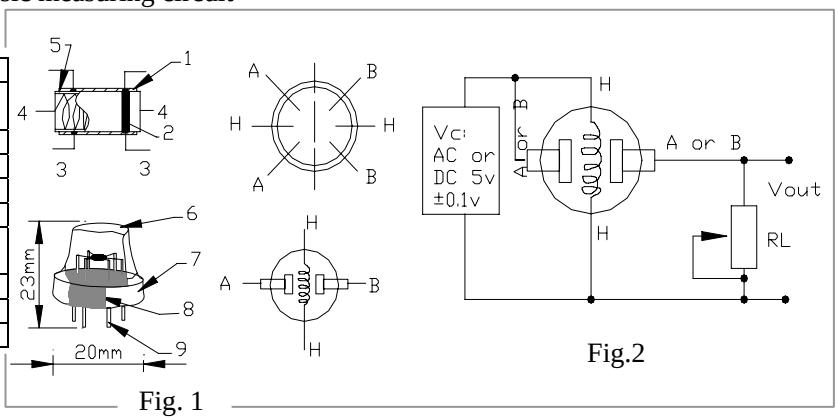
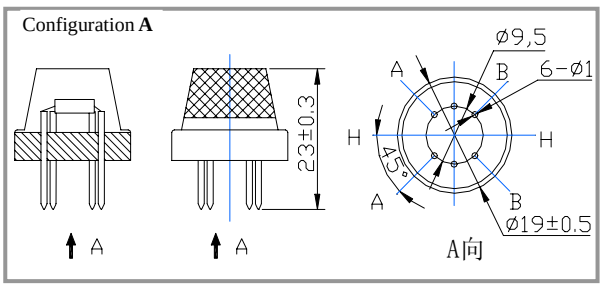
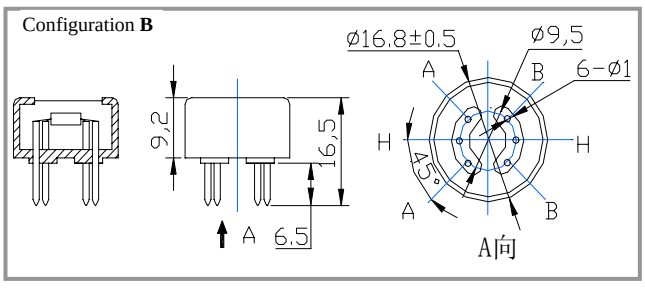


Fig. 1

Fig.2





Structure and configuration of MQ-8 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-8 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

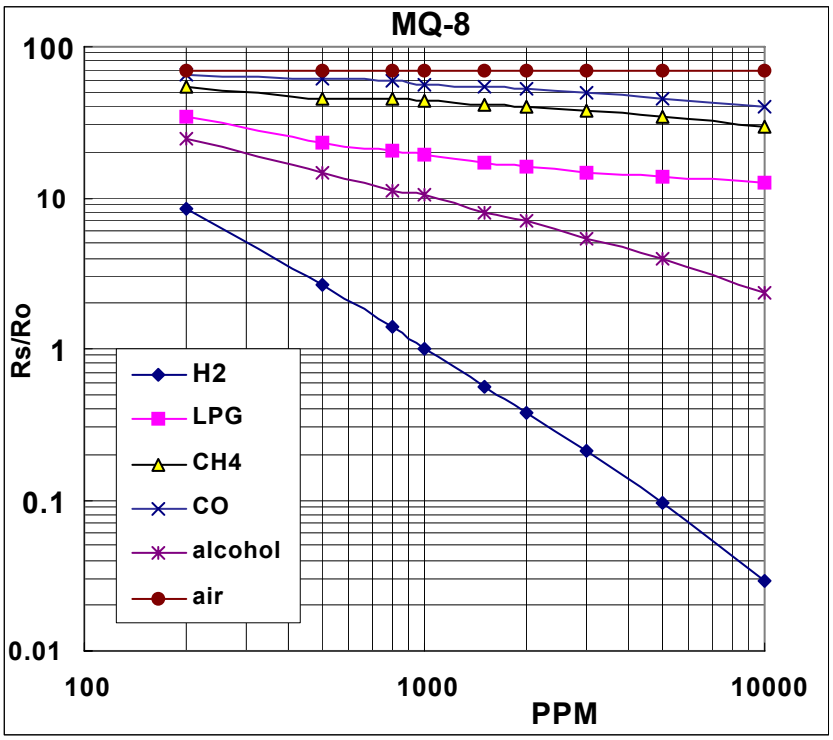


Fig.3 is shows the typical sensitivity characteristics of the MQ-8 for several gases.
in their: Temp: 20℃、
Humidity: 65%、
O_2 concentration 21%
RL=10kΩ
Ro: sensor resistance at 1000ppm H_2 in the clean air.
Rs:sensor resistance at various concentrations of gases.

Fig.2 sensitivity characteristics of the MQ-8

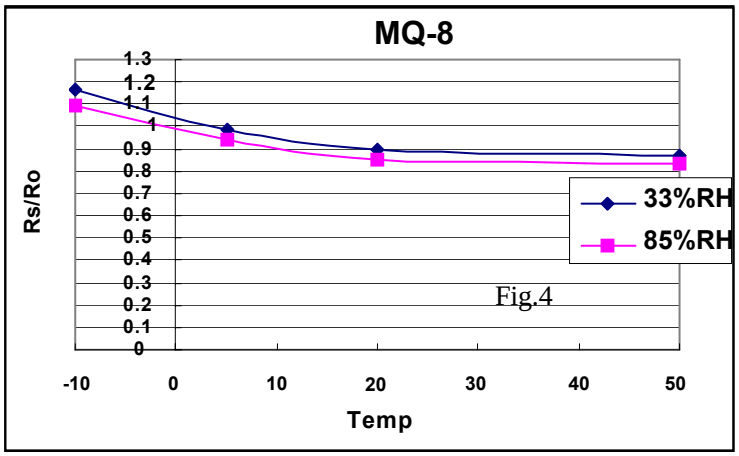


Fig.4

Fig.4 is shows the typical dependence of the MQ-8 on temperature and humidity.
Ro: sensor resistance at 1000ppm of H_2 in air at 33%RH and 20 degree.
Rs: sensor resistance at 1000ppm of H_2 in air at different temperatures and humidities.

SENSITVITY ADJUSTMENT

Resistance value of MQ-8 is difference to various kinds and various concentration gases. So,When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm H_2 concentration in air and use value of Load resistance (R_L) about 10 KΩ (5KΩ to 33 KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

TECHNICAL DATA MQ-9 GAS SENSOR

FEATURES

* High sensitivity to carbon monoxide and CH_4， LPG.

* Stable and long life

APPLICATION

They are used in gas detecting equipment for carbon monoxide and CH_4， LPG in family and industry or car.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	technical condition	Remark
Vc	circuit voltage	5V±0.1	AC or DC
V_H (H)	Heating voltage (high)	5V±0.1	AC or DC
V_H (L)	Heating voltage (low)	1.4V±0.1	AC or DC
R_L	Load resistance	Can adjust	
R_H	Heating resistance	33Ω ±5%	Room temperature
$T_{H(H)}$	Heating time (high)	60±1 seconds	
$T_{H(L)}$	Heating time (low)	90±1 seconds	
Ps	Heating consumption	Less than 340mw	

b. Environment conditions

Symbol	Parameters	Technical conditions	Remark
Tao	Using temperature	-20℃-50℃	
Tas	Storage temperature	-20℃-50℃	Advice using scope
RH	Relative humidity	Less than 95%RH	
O_2	Oxygen concentration	21%(stand condition) the oxygen concentration can affect the sensitivity characteristic	Minimum value is over 2%

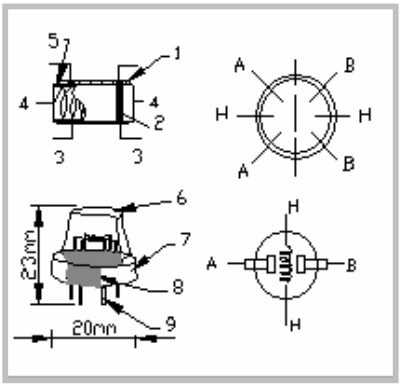
c. Sensitivity characteristic

symbol	Parameters	Technical parameters	Remark
Rs	Surface resistance Of sensitive body	2-20k	In 100ppm Carbon Monoxide
a (300/100ppm)	Concentration slope rate	Less than 0.5	Rs (300ppm)/Rs(100ppm)
Standard working condition	Temperature -20℃±2℃ relative humidity 65%±5% RL:10KΩ ±5%		
	Vc:5V±0.1V VH:5V±0.1V VH:1.4V±0.1V		
Preheat time	No less than 48 hours	Detecting range:20ppm-2000ppm carbon monoxide 500ppm-10000ppm CH_4 500ppm-10000ppm LPG	

D. Structure and configuration, basic measuring circuit

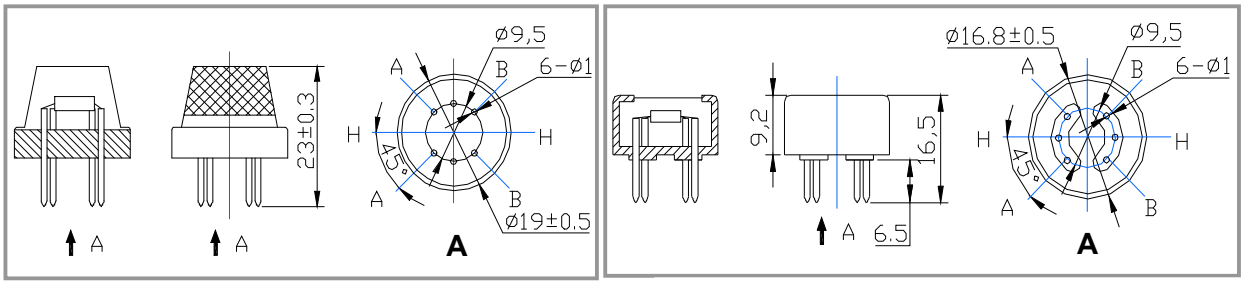
Structure and configuration of MQ-9 gas sensor is shown as Fig. 1 (Configuration A or B), sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-9 have

6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.



	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

Fig.1



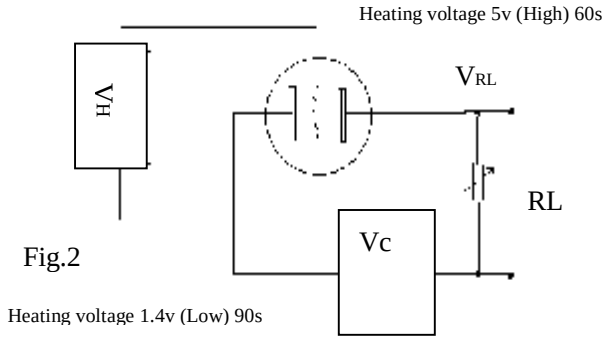


Fig.2

Standard circuit:

As shown in Fig 2, standard measuring circuit of MQ-9 sensitive components consists of 2 parts. one is heating circuit having time control function (the high voltage and the low voltage work circularly). The second is the signal output circuit, it can accurately respond changes of surface resistance of the sensor.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

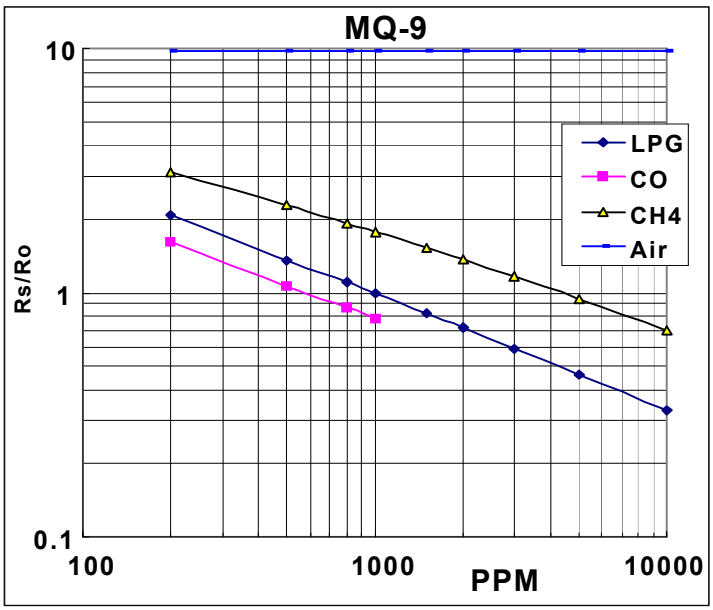


Fig.3 sensitivity characteristics of the MQ-9

Fig.3 is shows the typical sensitivity characteristics of the MQ-9 for several gases.

in their: Temp: 20℃、

Humidity: 65%、

O_2 concentration 21%

RL=10kΩ

Ro: sensor resistance at 1000ppm LPG in the clean air.

Rs: sensor resistance at various concentrations of gases.

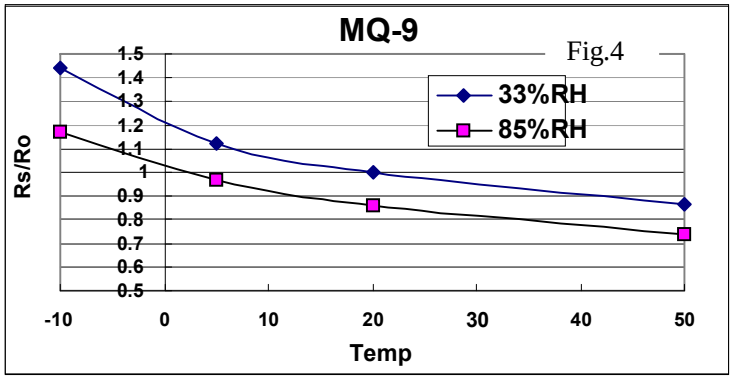


Fig.4

Fig.4 is shows the typical dependence of the MQ-9 on temperature and humidity.

Ro: sensor resistance at 1000ppm LPG in air at 33%RH and 20degree.

Rs: sensor resistance at 1000ppm LPG at different temperatures and humidities.

OPERATION PRINCIPLE

. The surface resistance of the sensor Rs is obtained through effected voltage signal output of the load resistance RL which series-wound. The relationship between them is described:

Rs\RL = (Vc-VRL) / VRL

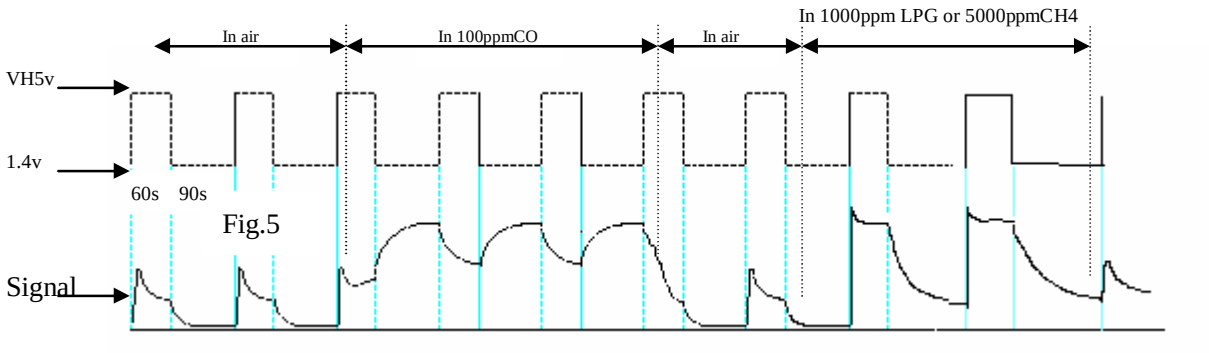


Fig.5

Fig. 5 shows alterable situation of RL signal output measured by using Fig. 2 circuit output signal when the sensor is shifted from clean air to carbon monoxide (CO) or CH_4, output signal measurement is made within one or two complete heating period (2.5 minute from high voltage to low voltage).

Sensitive layer of MQ-9 gas sensitive components is made of SnO_2 with stability, So, it has excellent long term stability. Its service life can reach 5 years under using condition.

SENSITVITY ADJUSTMENT

Resistance value of MQ-9 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 200ppm and 5000ppm CH_4 or 1000ppm LPG concentration in air and use value of Load resistance that(R_L) about 20 K Ω (10K Ω to 47 K Ω).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

The sensitivity adjusting program:

a. Connect the sensor to the application circuit.

b. Turn on the power, keep time of preheating through electricity is over 48 hours.

c. Adjust the load resistance RL until you get a signal value which is respond to a certain carbon monoxide concentration at the end point of 90 seconds.

d. Adjust the another load resistance RL until you get a signal value which is respond to a CH_4 or LPG concentration at the end point of 60 seconds .

TECHNICAL DATA MQ-135 GAS SENSOR

FEATURES

Wide detecting scope — Fast response and High sensitivity
Stable and long life — Simple drive circuit

APPLICATION

They are used in air quality control equipments for buildings/offices, are suitable for detecting of NH3,NOx, alcohol, Benzene, smoke,CO_2 ,etc.

SPECIFICATIONS

A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
Vc	Circuit voltage	5V±0.1	AC or DC
V_H	Heating voltage	5V±0.1	AC or DC
R_L	Load resistance	adjustable	
R_H	Heater resistance	33Ω ±5%	Room Temp.
P_H	Heating consumption	less than 800mw	

B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
Tao	Using Tem	-10℃-45℃	
Tas	Storage Tem	-20℃-70℃	
R_H	Related humidity	less than 95%Rh	
O_2	Oxygen concentration	21%(standard condition)Oxygen concentration can affect sensitivity	minimum value is over 2%

C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Ramark 2
Rs	Sensing Resistance	30KΩ-200KΩ (100ppm NH_3)	Detecting concentration scope: 10ppm-300ppm NH_3 10ppm-1000ppm Benzene 10ppm-300ppm Alcohol
α (200/50) NH_3	Concentration Slope rate	≤0.65	
Standard Detecting Condition	Temp: 20℃±2℃ Vc:5V±0.1 Humidity: 65%±5% Vh: 5V±0.1		
Preheat time	Over 24 hour		

D. Structure and configuration, basic measuring circuit

	Parts	Materials
1	Gas sensing layer	SnO_2
2	Electrode	Au
3	Electrode line	Pt
4	Heater coil	Ni-Cr alloy
5	Tubular ceramic	Al_2O_3
6	Anti-explosion network	Stainless steel gauze (SUS316 100-mesh)
7	Clamp ring	Copper plating Ni
8	Resin base	Bakelite
9	Tube Pin	Copper plating Ni

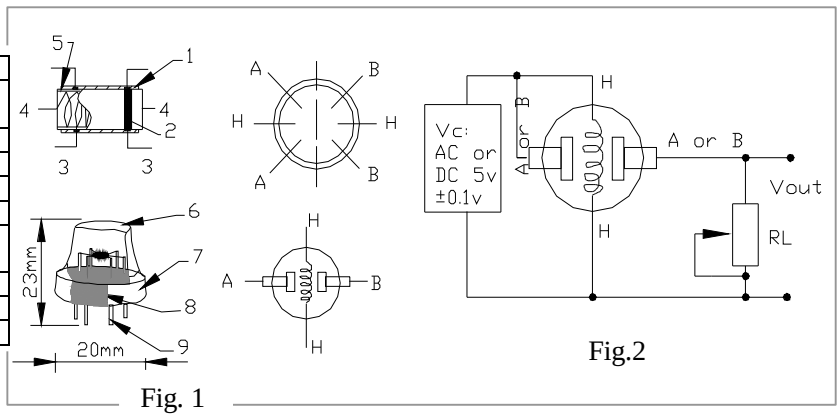
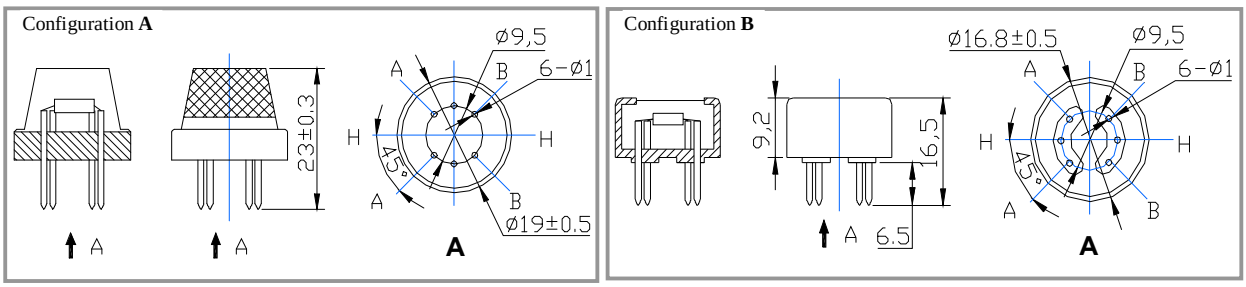


Fig. 1 Fig.2



Structure and configuration of MQ-135 gas sensor is shown as Fig. 1 (Configuration **A or B),** sensor composed by micro AL_2O_3 ceramic tube, Tin Dioxide (SnO_2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-135 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

Electric parameter measurement circuit is shown as Fig.2

E. Sensitivity characteristic curve

Fig.2 sensitivity characteristics of the MQ-135

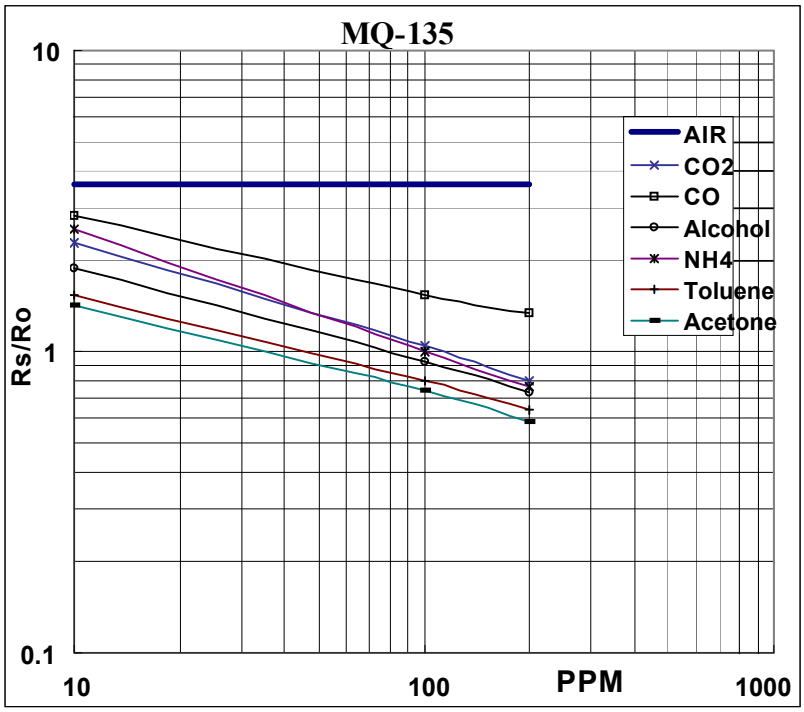


Fig.3 is shows the typical sensitivity characteristics of the MQ-135 for several gases.
in their: Temp: 20℃、
Humidity: 65%、
O_2 concentration 21%
RL=20kΩ
Ro: sensor resistance at 100ppm of NH_3 in the clean air.
Rs:sensor resistance at various concentrations of gases.

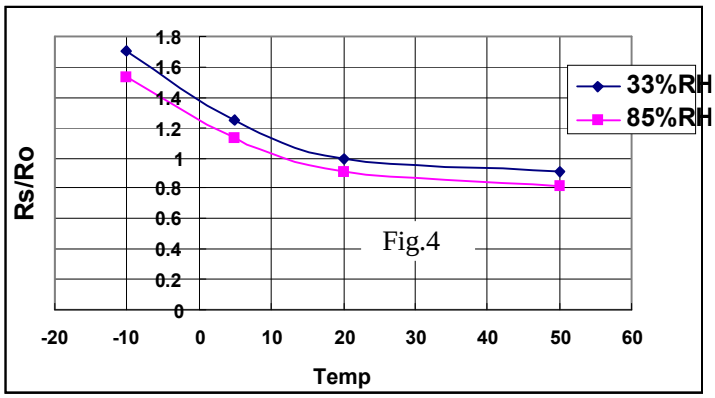


Fig.4

Fig.4 is shows the typical dependence of the MQ-135 on temperature and humidity.
Ro: sensor resistance at 100ppm of NH_3 in air at 33%RH and 20 degree.
Rs: sensor resistance at 100ppm of NH_3 at different temperatures and humidities.

SENSITVITY ADJUSTMENT

Resistance value of MQ-135 is difference to various kinds and various concentration gases. So,When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 100ppm NH_3 or 50ppm Alcohol concentration in air and use value of Load resistancethat(R_L) about 20 KΩ (10KΩ to 47 KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.