



NDIR Infrared CO2 Gas Sensor  
(Model: MH-441D-LOW)

# Manual

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Zhengzhou Winsen Electronics Technology CO., LTD

## MH-411D-LOW NDIR Infrared CO2 Sensor

### Introduction

MH-441D infrared gas sensor is a miniature universal intelligent sensor, which adopts NDIR theory to detect concentration of CH4 in air and has good selectivity, stable performance, long life, also is independent of Oxygen. The inside temperature sensor could be used for temperature compensation. This miniature infrared gas sensor is developed by the tight integration of mature infrared absorbing gas detection technology, micro machine workout and superior circuit design.

It is convenient in use and also instead of catalytic component directly, widely used in various occasions with flammable and explosion hazard gas.



### Features

- High sensitivity, high resolution, low power consumption, Fast response time
- Output method: UART, analog voltage signal
- Temperature compensation, excellent linear output
- Long lifespan, Excellent stability, Anti-poisons, anti-vapor interference

### Applications

Widely used for HVAC refrigeration, industrial-process control and safety protection, agriculture and animal husbandry.

### Main Parameters

Table 1

Model	MH-411D-LOW
Detection Gas	CO2
Working Voltage	3.6~5V DC(Need to be powered by safety barrier)
Average Current	<30 mA
Detection range	0-10%vol Optional(refer Table 2.)
Interface Level	3.0V
Output Signal	UART 0.4~2V(Need to be powered by safety barrier)
Warm-up time	3 min
Response time	T90<30s
Working Temperature	-20°C ~60°C
Working Humidity	0~95%RH(no condensation)
Sizes	Φ20 mm×22.2 mm
Weight	35g
Lifetime	>5 years
Defense Grade	IP54
Power, communication terminal	Ui=7.5VDC, Ii=265mA,
Intrinsic safety	Pi=0.5W, Ci=10 μ F, Li=0mH

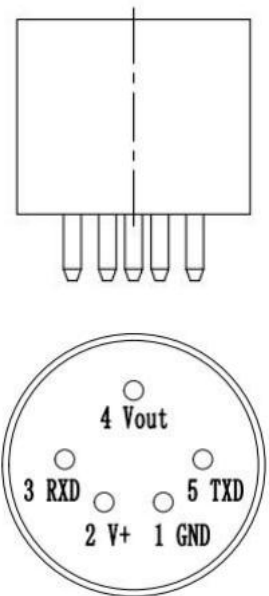


Figure 1: Sensor Structure diagram

Table 2.Measuring Range and Resolution

Target Gas	Measuring Range	Resolution	Decimal places	Remark
CH4	0~5%VOL	0.01% VOL	2	Temperature compensation
	0~10%VOL		2	
	0~100%LEL	1%LEL	None	

**Structure Size**

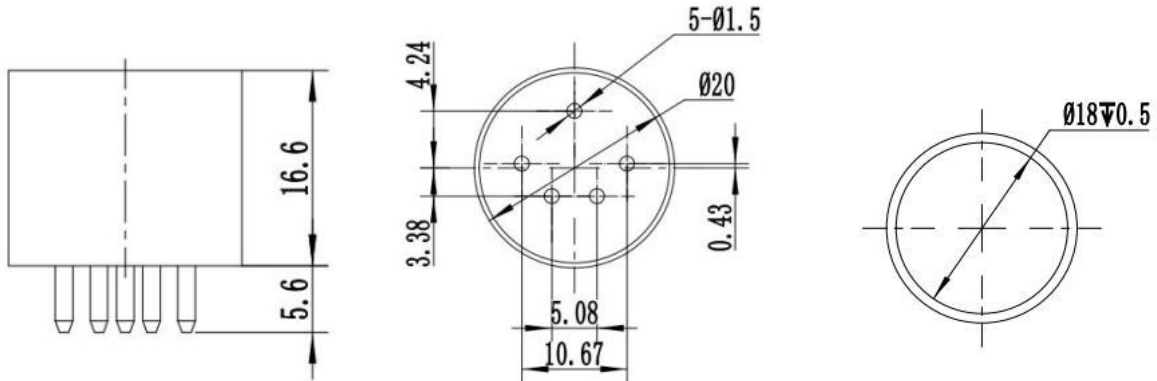


Fig 2.Sensor Size

■ **Pin definition**

Table3.Pin definition

Name of Pin	Explanation
Pin 2	V+ Voltage input
Pin 1	GND
Pin 4	Vout (0.4~2 V)
Pin 3	UART (RXD) 0~3.0 V data input
Pin 5	UART (TXD) 0~3.0 V data output

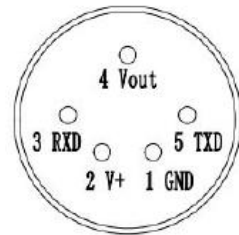


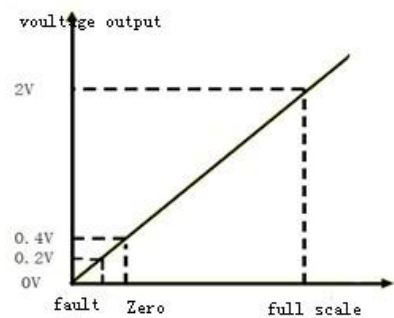
Fig 3.Pin definition

**Analog voltage output**

The output of Vout is proportional to the gas concentration, 0.4-2.0V output stands for 0 to full range.

Connection: Vin -5V,GND- Power Ground, Vout-ADC input.

After warm-up, If self-checking detect a fault, output voltage is 0V.



**Digital Output**

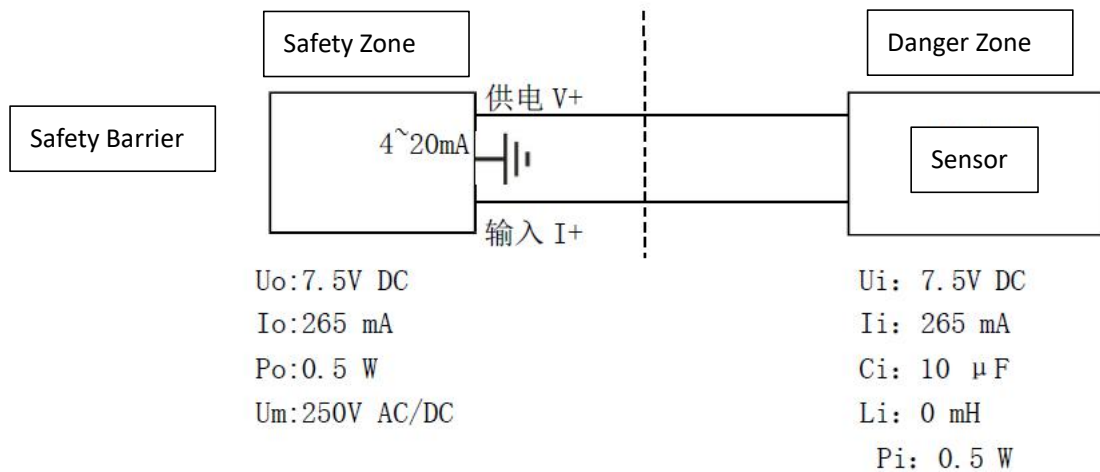
Please refer MH-410D communication protocol.

Intrinsically safe explosion-proof

- This product meets the standards of GB3836.1-2010 "Explosive Atmosphere Part 1: General Requirements for Equipment" and GB3836.4-2010 "Explosive Atmosphere Part 4: Equipment Protected by Intrinsically Safe "i" standards" ; the explosion-proof mark is Exib II B T4 Gb, it is suitable for zone 1 and zone 2, contains Class IIA, T1-T3 explosive environment formed by the flammable gas, mixture of steam and air; it has passed the inspection by the National Quality Inspection Center for Explosion-proof Electrical Products and obtained the explosion-proof certificate. When using, please note the following:
- The intrinsically safe power supply must be used to power the sensor, otherwise the explosion-proof performance will be affected.
- It is forbidden to replace the sensor in dangerous places.
- It is forbidden to disassemble or replace the sensor element to avoid affecting the explosion-proof performance.
- It is not allowed to replace components or structures, so as not to affect the explosion-proof performance.
- The installation and wiring of the safety barrier must be carried out in accordance with the safety barrier instruction manual, and the safety barrier must obtain an explosion-proof certificate.

**Connection diagram of intrinsically safe explosion-proof system**

The on-site installation must comply with the relevant regulations of the GB3836.15 — 2000 "Electrical Equipment for Explosive Gas Environment Part 15: Electrical Installation in Hazardous Locations (Except Coal and Mines).



The distribution parameters of the connecting cable between the safety barrier and the sensor should meet:

$$C_c \leq C_o - C_i \quad L_c \leq L_o - L_i \quad U_i \geq U_o \quad I_i \geq I_o \quad P_i \geq P_o$$

Note:

U<sub>o</sub>: Maximum output voltage of safety barrier;

I<sub>o</sub>: Maximum output current of safety barrier

P<sub>o</sub>: Maximum output power of safety barrier

Co: Maximum external capacitance of safety barrier

Lo: the maximum external inductance of the safety barrier (see the safety barrier instructions for the above parameters book)

Cc: Maximum allowable distributed capacitance of connecting cable

Ui: sensor maximum input voltage

Ii: Maximum sensor input current

Pi: sensor maximum input power

Ci: Maximum internal capacitance of the sensor

Li: Maximum internal inductance of the sensor

Lc: Maximum allowable distributed inductance of connecting cable

**Note:**

- The sensor should be calibrated regularly, and the recommended calibration period is 6 months.
- Do not use the sensor for a long time in an environment with high dust density.
- Please use the sensor within the power supply range of the sensor.
- It is forbidden to cut or weld the sensor pins.

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