Winsen
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NDIR Infrared CO2 Gas Sensor

（Model：MH-411D）

Manual

Version: 1.1

Valid from: 2022.12.01

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

MH-411D NDIR Infrared CO2 Sensor

Introduction

MH-411D infrared gas sensor is a miniature universal intelligent sensor, which adopts NDIR theory to detect concentration of CO2 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.

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 Table1

Model	MH-411D
Detection Gas	CO2
Working Voltage	3.6~5V DC(Need to be powered by safety barrier)
Average Current	<85 mA
Detection range	0-10%vol Optional (refer table2.)
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×22.4 mm
Weight	35g
Lifetime	>5 years
Defense Grade	IP54
Power, communication terminal Intrinsic safety	Ui=7.5VDC，Ii=265mA，Pi=0.5W， Ci=10 μF， Li=0mH

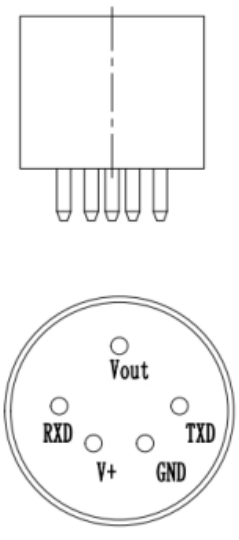


Fig 1. Appearance of sensor

Table2.Measuring Range and Resolution

Target Gas	Measuring Range Analog output	Measuring Range Digital output	Accuracy	Note
CO2	0~2000 ppm	400ppm~full scale Default	±(50ppm + 5% of Read Value)	Temperature compensation
	0~6000 ppm			
	0~1% VOL			
	0~3% VOL	0~full scale Customizable		
	0~5%VOL			

Structure Size （Unmarked size tolerance is ±0.2）

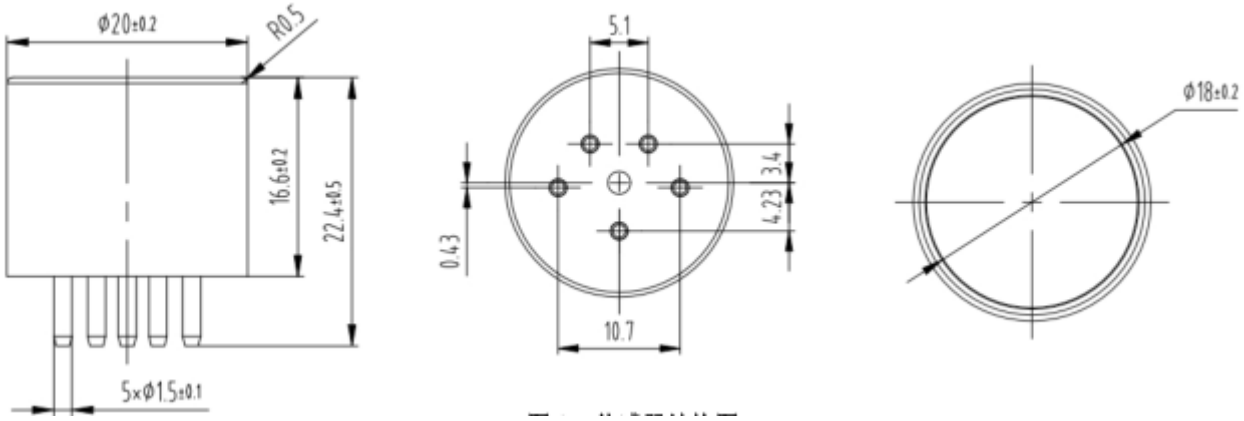


Fig 2.Sensor structure

Pin definition

table3.Pin definition

Name of Pin	Explanation
Pin 2	V+ Vin 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

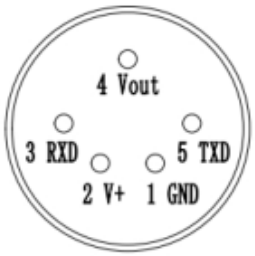
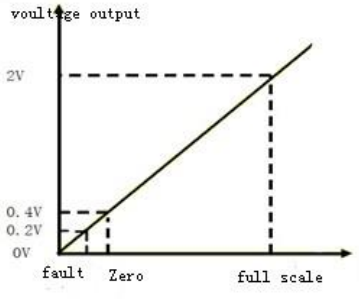


Fig3. Pin definition

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.

Output concentration = sensor range * output voltage (V) / (2 - 0.4).



Digital Output

Please referMH-411D communication protocol.

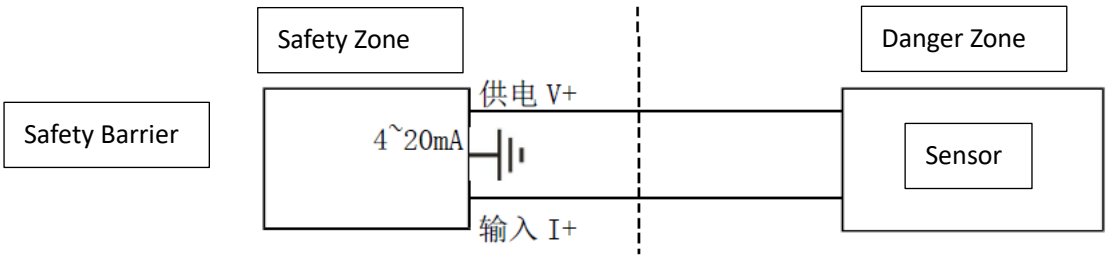
Intrinsically safe explosion-proof

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 ⅡB 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).



Uo:7.5V DC
Io:265 mA
Po:0.5 W
Um:250V AC/DC

Ui: 7.5V DC
Ii: 265 mA
Ci: 10 μF
Li: 0 mH
Pi: 0.5 W

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

Cc≤Co-Ci Lc≤Lo-Li Ui≥Uo Ii≥Io Pi≥Po

Note:

Uo: Maximum output voltage of safety barrier.

Io: Maximum output current of safety barrier

Po: 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.
- The sensor should be kept away from heat sources and away from direct sunlight or other thermal radiation.
- Please use the sensor within the power supply range of the sensor.
- It is forbidden to cut or weld the sensor pins.

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
Website: www.winsen-sensor.com