Intelligent Infrared CO_2 Gas Sensor

(Model: MH-712B)

Manual

Version: 2.0

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Zhengzhou Winsen Electronics Technology Co., Ltd.

Statement

Thanks for purchasing our product. In order to keep customers using 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-712B Infrared CO2 Gas Sensor

1. Product Description

MH-712B is a universal type intelligent sensor to detect CO2 in air taking advantages of non-dispersive infrared (NDIR) principle. With good selectivity, no oxygen dependence, stable performance and long lifespan features, MH-712B also has built-in temperature compensation feature. It is a compact and high-performance sensor based on infrared absorption of gas detection technology, micro-machining and sophisticated circuit design.

2. Characteristics

- High Sensitivity and resolution, low power consumption, fast response
- Output method: UART, analog voltage output signal, etc.
- Temperature compensation, excellent linear output
- Good stability
- Long lifespan
- Anti-poisons, anti-vapor interference

3. Application

Widely used for industrial field instrumentation, industrial-process control and safety protection

4. Technical Parameters

Table 1 Technical Index

Product Model	MH-712B
Target Gas	CO2
Working Voltage	4.5 V ~ 5.5V DC
Average Current	< 100mA
Interface Level	3.3V
Measurement Range	0~5%VOL optional (view table 2)
Output Signal	UART
	0.4-2V DC
Warm-up Time	< 2min
Response Time	T_{90} < 30s
Working Temp.	-40℃ ~ 70℃
Working Humidity	0 ~ 95%RH, Non-condensing
Dimension	Φ39×44mm
Weight	280g
Lifespan	>5 years
Protected Class	IP54

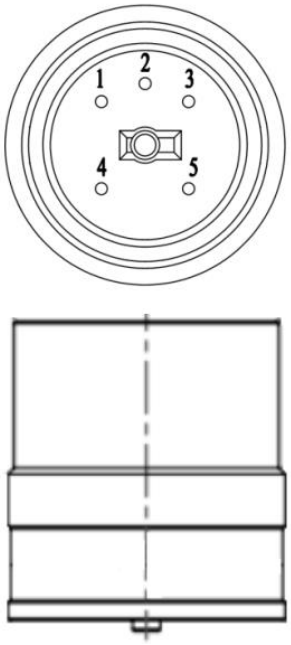


Fig1.Sensor construction

Table 2: Measurement Range and Accuracy

Detected Gas	Measurement Range	Accuracy	Remarks
Carbon Dioxide (CO2 gas)	0~2000ppm	±(50ppm±5% reading)	Temperature compensation
	0~6000ppm		Temperature compensation
	0~1%VOL		Temperature compensation
	0~3%VOL		Temperature compensation
	0~5%VOL		Temperature compensation

5. Structural Drawing

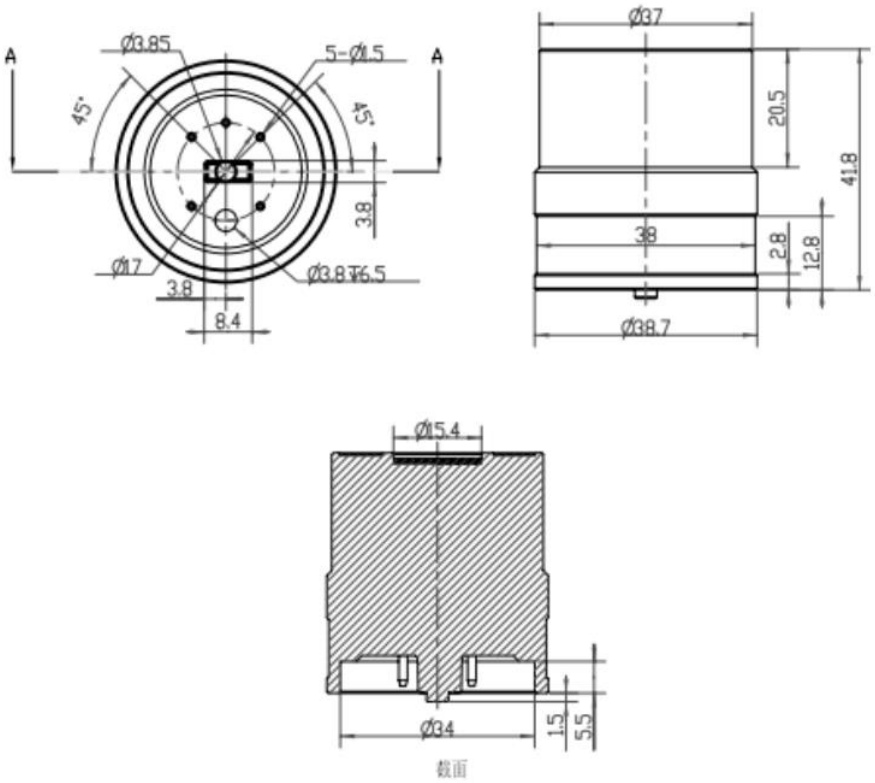


Figure 2 Sensor Sizes

Stable 3: Pin Definition

Pin No.	Description
Pin1	Vin (voltage input)
Pin1	GND
Pin1	Vout (0.4～2V)
Pin1	UART (RXD) 0~3.3V data input
Pin1	UART (TXD) 0~3.3V data output

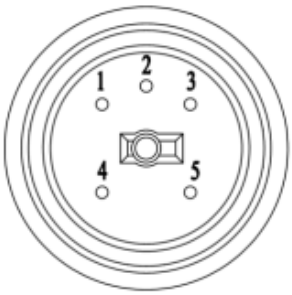


Fig3.Pins

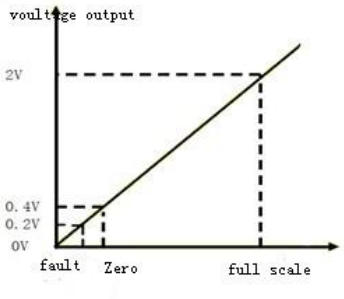
Analogue Voltage Output

Voltage output range 0.4 to 2V, relatively stands for 0 to full scale.

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

After warming-up , the Vout will show a voltage value which stands for the gas concentration.

If self-checking detects a fault, output voltage is 0V.



Calculation method: C_{ppm}=(Vout-0.4V)*full scale/2.0V-0.4V

Serial Output(UART)

Hardware Connections

Connect the Vin-GND-RXD-TXD of the sensor to the user's 5V-GND-TXD-RXD one to one correspondence. (The client must use a TTL level, and if it is an RS232 level, it must be converted).Users can read gas concentration via UART interface of sensor, no need to calculate..

Software settings

Set the serial baud rate to 9600, the data bytes to 8 bytes, the stop byte to one byte, the parity byte to none.

Protocol command interface list and meaning	
0x86	To read gas concentration value
0x87	To calibrate zero point（ZERO）
0x88	To calibrate span point（SPAN）

0x86- To reading gas concentration value								
Send command								
Byte 0	Byte 1	**Byte 2**	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Start byte	Sensor no.	**Command**	-	-	-	-	-	checksum
0XFF	0x01	**0x86**	0x00	0x00	0x00	0x00	0x00	0x79
Returning								
Byte 0	Byte 1	**Byte 2**	**Byte 3**	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Start byte	command	**Concentration high-position**	**Concentration low-position**	-	-	-	-	checksum
0XFF	0x86	**0x02**	**0x60**	0x47	0x00	0x00	0x00	0xD1
Gas concentration value=Concentration high-position *256+Concentration low-position								

0x87-To calibrate sensor zero point								
Send command								
Byte0	Byte1	**Byte2**	**Byte3**	**Byte4**	Byte5	Byte6	Byte7	Byte8
Start byte	Sensor no.	**Command**	-	-	-	-	-	checksum
0XFF	0x01	**0x87**	**0x00**	**0x00**	0x00	0x00	0x00	0x78
The sensor has no return value								

0x88-To calibrate sensor span point								
Byte0	Byte1	**Byte2**	**Byte3**	**Byte4**	Byte5	Byte6	Byte7	Byte8
Start byte	Sensor no.	**Command**	**Concentration high-position**	**Concentration low-position**	-	-	-	checksum
0xFF	0x01	**0x88**	**0x07**	**0xD0**	0x00	0x00	0x00	0xA0
The sensor has no return value								

Calibrate and Calculate

The checksum = (invert (byte1 +byte2+byte3... + byte7)) + 1

For example

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	No.	command	-	-	-	-	-	Checksum
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	checksum

1. Add from Byte1 to Byte7: 0x01 + 0x86+ 0 + 0 + 0 + 0 + 0 + 0 = 0x87
2. Negation: 0xff – 0x87 = 0x78
3. Add 1: 0x78 + 0x01 = 0x79

Example Program

C Language Calibrate & Calculate and Routine

```
char getCheckSum(char *packet)
{
    char i, checksum;
    for( i = 1; i < 8; i++)
    {
        checksum += packet[i];
    }
    checksum = 0xff – checksum;
    checksum += 1;
    return checksum;
}
```

Cautions

1.The sensor should be calibrated regularly. Recommended cycle time is once per 6 months.

2.Do not use the sensor in the high dusty environment for long time.

3.Please use the sensor with correct power supply.

4.Forbid cutting or soldering sensor's pins.

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