Winsen
炜盛科技

Combustible Gas Sensor

(Model: MH-T7042A)

Manual

Version: 1.0

Valid from: 20th, Jul 2023

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.

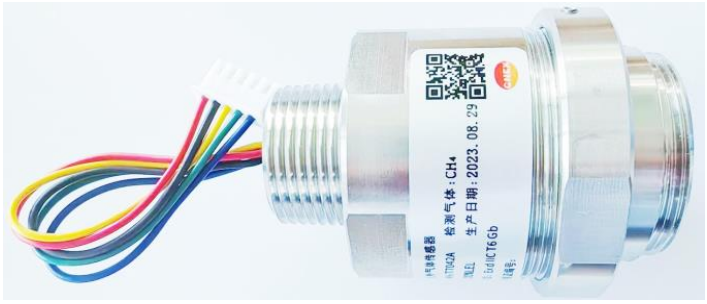
Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD.

MH-T7042A Infrared CH4 Gas Sensor

1. Product Description

MH-T7042A is a universal type intelligent sensor to detect CH4 gas, taking advantage of non-dispersive infrared (NDIR) principle. With high selectivity, no oxygen dependence, high performance and long lifespan features, MH-T7042A also has built-in temperature compensation feature. MH-T7042A is a compact and high-performance sensor based on infrared absorption of gas detection technology, micro-machining and sophisticated circuit design.



2. Features

- High sensitivity, high resolution, low power consumption
- Output method: IIC, analog voltage signal, etc.
- Quick response
- Temperature compensation, excellent linear output
- Excellent stability, Long lifespan
- Anti-poisons, anti-vapor interference
- Detect combustible gas concentration matching with flame-proof marked detector in area 1&2 explosive environments which mix of ⅡA, ⅡB, ⅡC and T1-T6 flammable gases, vapors and air

3. Application

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

4. Specification

Table 1 Technical Index

Product Model	MH-T7042A
Gas Detected	Combustible gas (see Table 2)
Working Voltage	4.5~5.5V DC
Average Current	< 100mA
Interface Level	3.3V
Measurement Range	0~100%VOL optional (table 2)
Output Signal	UART
Warm-up Time	<2 minutes
Response Time	T_{90} < 30s
Working Temperature	-40℃ ~ 70℃
Working Humidity	0 to 95%RH, non-condensing
Dimension	Φ51×65mm
Weight	450g
Lifespan	>5 years
Explosion-proof sign	Ex db ⅡC T6 Gb
Protection Grade	IP65

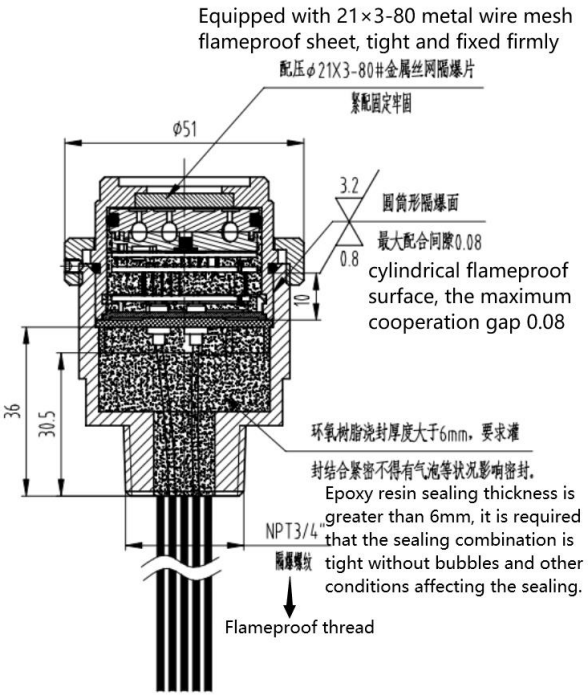


Fig 1 Sensor structure diagram

Table 2

Gas Name	Molecular Formula	Detection Range	Resolution	Precision	Note
Methane	CH_4	0-5% Vol	0.01% Vol	0~50% FS (±3%FS) 50%~100% FS (±5%FS)	With Temperature compensation
Methane	CH_4	0-10% Vol	0.01% Vol		
Methane	CH_4	0-100% Vol	0.1% Vol		
Propane	C_3H_8	0-2.2% Vol	0.01% Vol		
Chloromethane	CH_3CL	0-8.1% Vol	0.01% Vol		
Acetylene	C_2H_2	0-2.3% Vol	0.02% Vol		
Ethane	CH_3CH_3	0-3.0% Vol	0.03% Vol		
Isobutene	C_4H_{10}	0-1.8% Vol	0.018% Vol		
Gasoline	C_3-C_{12}	0-1.1% Vol	0.01% Vol	0~50% FS (±5%FS) 50%~100% FS (±10%FS)	No Temperature compensation
Methanol	CH_3OH	0-5.5% Vol	0.06% Vol		
Dichloromethane	CH_2CL_2	0-15% Vol	0.15% Vol		
Toluene	C_7H_8	0-1.2% Vol	0.012% Vol		
Alcohol	C_2H_5OH	0-3.3% Vol	0.033% Vol		
Oxirane	C_2H_4O	0-3.0% Vol	0.03% Vol		
Acetic acid	CH_3COOH	0-4.0% Vol	0.04% Vol		
Ethyl acetate	$CH_3COOC_2H_5$	0-2.0% Vol	0.02% Vol		

Note: The range in the above table is the common range, users can customize according to their own needs.

Substances that are liquid at room temperature cannot be temperature compensated. Please be careful when selecting.

5. Dimension Drawing

(No dimensional tolerance is ±0.2)

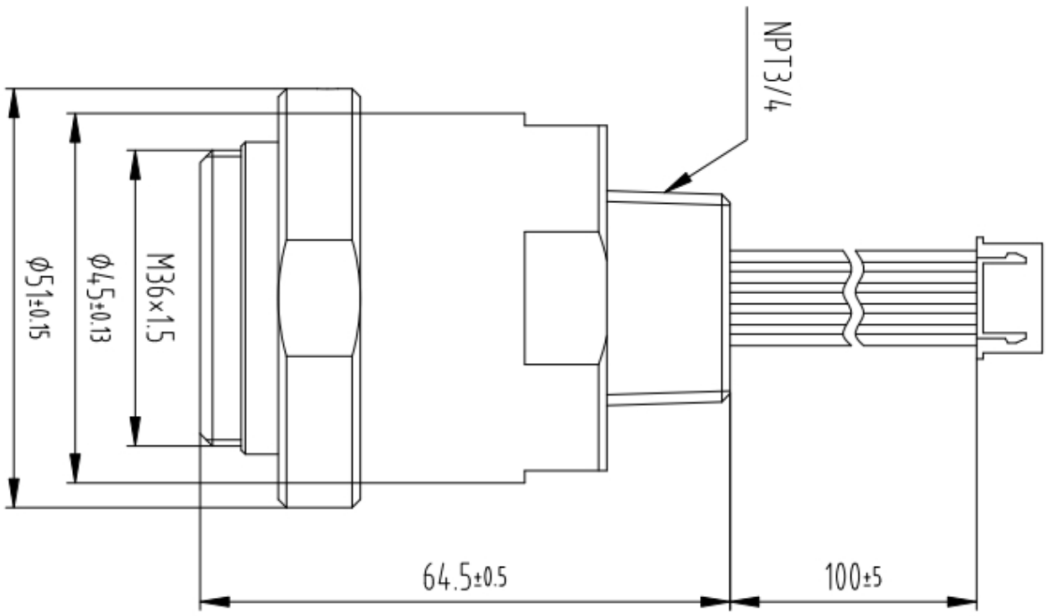


Figure 2 Dimension Drawing of Sensor

Table 3 Pin Definition

Pin	Description
Pin 1	Shell, grounded
Pin 2	UART(RXD) 0-3.0V data input
Pin 3	UART(TXD) 0-3.0V data output
Pin 4	GND
Pin 5	Vin voltage input

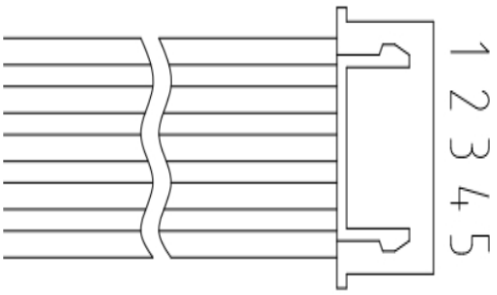


Figure 3 Pin definition drawing

6. UART Output

Hardware connection

Connect the Vin-GND-RXD-TXD of the sensor to the user's 5V-GND-TXD-RXD. (The user end must use TTL level, and if it is RS232 level, conversion must be performed). The detector can directly read the gas concentration value through the UART interface of the sensor, without the need for calculation.

Software connection

Set the serial port baud rate to 9600, data bit to 8, stop bit to 1, and parity bit to none.

0x86	Read Gas Concentration
0x87	Calibrate zero point（ZERO）
0x88	Calibrate span point（SPAN）

0 x86 - Gas Concentration Reading

1	0x86	**Gas Concentration Reading**							
Send	0	1	2	33	4	5	6	7	8
	Start Byte	Sensor Number	Command	--	--	--	--	--	Check Code
	0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	0x79
Return Value									
Return	0	1	2	3	4	5	6	7	8
	Start Byte	Command	Concentration high level	Concentration low level	--	--	--	--	Check Code
	0xFF	0x86	0x02	0x60	0x47	0x00	0x00	0x00	0XD1

Gas concentration= high *256 + low

0 x87 - Calibrate Zero Point

Send	0	1	2	3	4	5	6	7	8
	Start Byte	Sensor Number	Command	--	--	--	--	--	Check Code
	0xFF	0x01	0x87	0x00	0x00	0x00	0x00	0x00	0x78
Sensor no return value									

0 x88 - Calibrate Span Value

Send	0	1	2	3	4	5	6	7	8
	Start Byte	Sensor Number	Command	High span value	Low span value	--	--	--	Check Code
	0xFF	0x01	0x88	0x07	0xD0	0x00	0x00	0x00	0XA0
Sensor no return value									

Checksum & calculation method

The checksum = (invert (byte0 +... + byte7)) + 1

For example, Gas Concentration Reading

	Command Sent							
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start byte	Sensor Number	Command	-	-	-	-	-	Check Value
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	Checksum

A. Add all the bytes together except byte 0

0x01 + 0 x86 + 0 x00 + 0 x00 + 0 x00 + 0 x00 + 0 x00 = 0x87

B. Get the value from step A, then invert it.

0xFF– 0x87 = 0x87

C. Plus one based on the value of step B

0x78 + 0x01 = 0x79

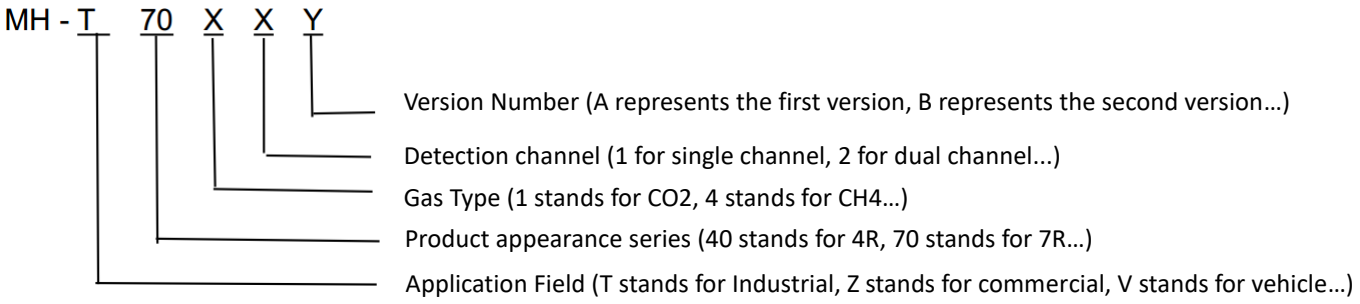
C Language Calibrate & Calculate and Routine

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

7. Ordering instructions

In order to be able to provide a sensor that meets the needs of the customer, the customer is requested to provide the following details.

1. Sensor Model Name.



2. Sensor detection range and resolution (refer to Table 2)

8. Matters needing attention

- Sensors should be calibrated regularly, with a recommended calibration cycle of 6 months.
- Do not use sensors for a long time in environments with high dust density.
- Please use the sensor within its power supply range.

9. Cautions

- Sensors can only be used in conjunction with detectors with explosion-proof markings and are strictly prohibited from being used alone.
- It is prohibited to disassemble or replace sensors in hazardous areas. Sensor disassembly and replacement must be carried out in a safe environment.
- It is prohibited to install and fix sensors in a way that affects their explosion-proof performance, such as drilling holes.
- The working voltage of the sensor is 4.5-5.5V DC, and the recommended voltage is 5V. If the power supply voltage exceeds 5.5V, it will cause permanent damage to the sensor. If the voltage is lower than 4.5V, the DC sensor will not function properly.
- Sensors and detectors with explosion-proof markings can only be connected through explosion-proof threads, and must be sealed with sealing rings that meet explosion-proof requirements. The connection between explosion-proof threads must take anti loosening measures.

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