Product Specifications

Model: TZHCO-01B

Version: V1.2

Date: Jan.5st, 2024

Taiyuan Tengxing sensor technology Co., Ltd

Declaration

1. The copyright of instructions belong to Taiyuan Tengxing sensor technology Co., Ltd(hereinafter referred to as the Company), nobody is allowed to copy, translate, spread or store without written approval.

2. Thanks for using our product. In order to use the products more smoothly, reduce faults result from inappropriate using, please read the instructions carefully before using and follow the rules suggested strictly. Anyone who don't follow the instructions, disassemble or change the internal components without permission will afford the loss.

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5. Please make sure it's valid before using the instructions. Any good suggestions from you is welcomed.

6. The instructions should be well kept.

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1.Description

Four-in-one gas detection module TZHCO-01B

The four-in-one gas detection module TZHCO-01B is mainly aimed at various places where environmental gas detection is required. The product contains four gas sensors (CO, H2S, O2 and CH4) and a signal processing circuit board. The module has good selectivity and stability. The module can output the current concentration values   of the four gases in real time through the digital serial port output. It can be used for human wear, handheld or fixed equipment to detect the current environmental gas concentration. The module is a universal miniaturized product that closely combines mature sensor detection technology with sophisticated circuit design.

2. Module Features

①Temperature compensation High integration Small size

②Good stability

③Fast response

④Real-time serial port output concentration

⑤Easy to use

3. Main applications:

factory gas leaks, underground operations, tunnel inspections, coal mine inspections

4.Technical specifications

Detect gas	CO	H2S	O2	CH4
Measuring range	（0-1000）ppm	0-100ppm	（0-30）%VOL	（0-100）%LEL
resolution	1ppm	1ppm	0.1%VOL	1%LEL
Working voltage	（3.5~5）V			
Working current	<100mA			
response time	<30s			
Output mode	UART output (2.8V level)			
working temperature	-20 ℃～50ºC			
Working humidity	15%RH~90%RH no condensation			
Storage temperature	0°C~20°C(recommended)			
life expectancy	2 years (in normal air)			
weight	<50g			

Sensor type	CO	H2S	O2	CH4
sensor location	S1	S2	S3	S4
Level 1 alarm	75~150ppm	10~15ppm	≦18.5%VOL	20%~50%LEL
Level 2 alarm	≧150ppm	≧15ppm	≧23.0%VOL	≧50%LEL

Notes: The sensor positions S1, S2, S3, S4 are shown in Figure 1.

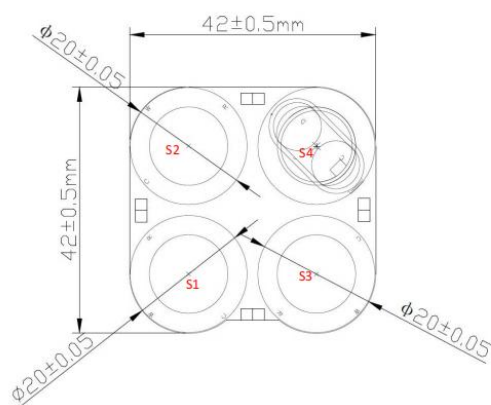## 5.Module structure diagram (unit:mm)
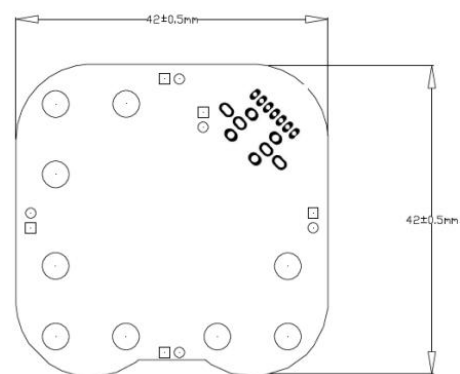

Figure 1: Module top view
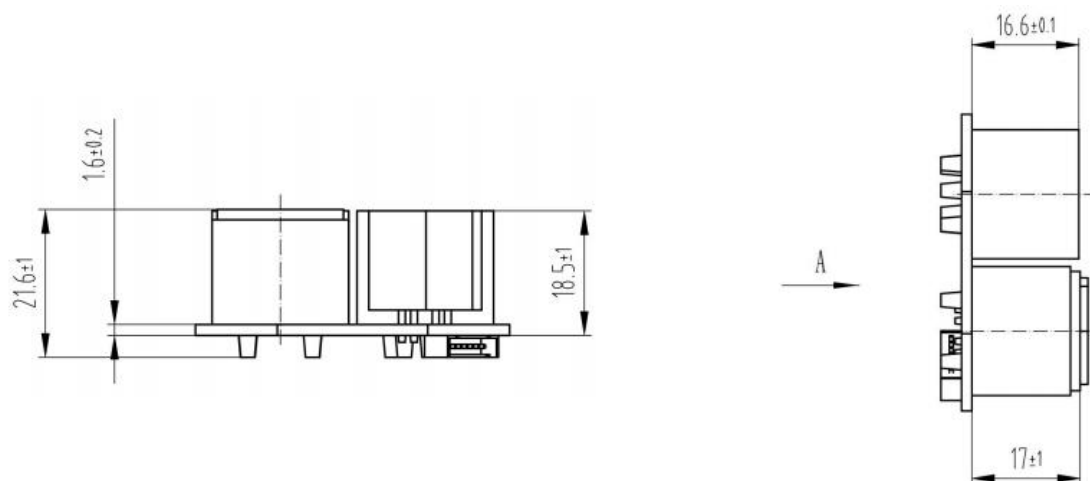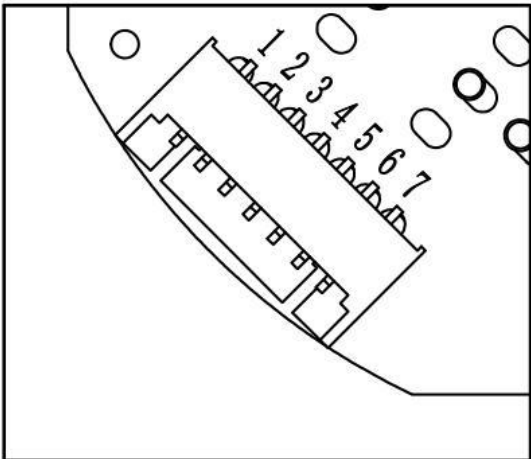

Figure 2: Module bottom view

Figure 3, Figure 4: Side view of the module

6.Pin Definition

Pin name (Right picture from top to bottom)	Pin description
Pin1	reserved
Pin2	TX
Pin3	RX
Pin4	VCC
Pin5	GND
Pin6	reserved
Pin7	reserved

7. Indicator Light Introduction

indicator light	quantity	Function	Flashing characteristics	Remark
green light	1	Power on indicator light	Flashes after power-on, indicating the module is powered on normally, flashes once per second	Keeps flashing after power on
red light	1	Alarm indicator light	If the concentration of any gas reaches the first-level alarm state but does not reach the second-level alarm state, the first-level alarm will flash once per second. If the concentration of any gas reaches the second-level alarm state, the second-level alarm flashes twice per second.	The module is preheated within 3 minutes after power-on Status, no alarm, no flashing

8. Notes:

• The module is connected to the terminal block. It is forbidden to weld on the module at will.

• The sensor of the module is strictly prohibited to be replaced privately.

• When the module is used for the first time or has not been used for a long time, it needs to be aged for 24 hours to ensure the accuracy of the sensor.

- Do not use this module in systems involving personal safety.
- The module has been calibrated before leaving the factory. After that, it should be calibrated regularly according to the usage and exposure of the equipment to harmful gases or pollutants.
- When the module reading exceeds the measurement range, it means that the target gas concentration may reach an explosive and seriously dangerous concentration.
- Avoid exposing the combustible gas sensor to lead compounds, silicone resins, and chlorinated hydrocarbons. Although some organic vapors (such as leaded gasoline and halogenated hydrocarbons) may cause the sensor to temporarily stop working normally due to poisoning, resulting in a decrease in sensitivity, in most cases, its function can be restored through calibration.
- Long-term exposure of the module to a certain concentration of combustible gas or toxic and harmful air may increase the load on the sensor and may seriously affect its performance. If the module has ever alarmed due to extremely high gas concentration, it should be recalibrated or the sensor should be returned to the factory for replacement if necessary.
- In some environments, severe electromagnetic interference may cause data deviation or even fluctuation.

TZHCO-01B Communication Protocol

Communication Protocol

1. General Settings

Baud rate	9600
Data bits	8
Stop bits	1
Parity bits	no

2.Communication default parameters

Gas type	CO	H2S	O2	CH4
Unit	ppm	ppm	%vol	%LEL
Range	1	1	0.1	1

3.Communication Commands

Communication is divided into active upload and question-and-answer. In active upload, the concentration value is sent every 1S. In question-and-answer, a query command needs to be sent before the module can reply. The format of active upload is the same as that of question-and-answer reply, and the format is as follows:

0	1	2	3	4	5	6	7	8	9	10
Start bit	Order	CO High	CO Low	H2S High	H2S Low	O2 High	O2 Low	CH4 High	CH4 Low	Check sum
OxFF	0x86	0x00	0x00	0x00	0x00	0x00	0xD1	0x00	0x00	0xA9

Note: Gas concentration value = (gas concentration high bit * 256 + gas concentration low bit) * resolution.
For example, O2 displays 0x00 0xD1, and the actual concentration is converted to 20.9%VOL.

Switch to question and answer mode. The command line format is as follows:

0	1	2	3	4	5	6	7	8
Start bit	Reserved	Switch Command	Q&A	Reserved	Reserved	Reserved	Reserved	Check sum
0xFF	0x01	0x78	0x41	0x00	0x00	0x00	0x00	0x46

Switch to active upload, the command line format is as follows:

0	1	2	3	4	5	6	7	8
Start bit	Reserved	Switch Command	Active upload	Reserved	Reserved	Reserved	Reserved	Check sum
0xFF	0x01	0x78	0x40	0x00	0x00	0x00	0x00	0x47

The format for querying gas concentration values in the question-and-answer state is as follows:

0	1	2	3	4	5	6	7	8
Start bit	Reserved	Command	Reserved	Reserved	Reserved	Reserved	Reserved	Check sum
0xFF	0X01	0X86	0X00	0X00	0X00	0X00	0X00	0X79

The query command reply format is the same as Communication Commands

4.Checksum calculation

Function name: unsigned char FucCheckSum(uchar *i,ucharln)

Function: Sum check

Function description: Add the elements 1 to the second-to-last element of the array and then invert it + 1 (the number of elements must be greater than 2)

```c
unsigned char FucCheckSum(unsigned char *i,unsigned char In)
{
    unsigned char j,tempq=0;
    i+=1;
    for(j=0;j<(In-2);j++)
    {
        tempq+=*i;
        i++;
    }
    tempq=(~tempq)+1;
    return(tempq);
}
```

Usage suggestions:

1. To ensure the accuracy of the product, please calibrate the product regularly. It is generally recommended to calibrate once every six months to one year.

2. The power supply of the module must ensure stability. Large ripple may cause fluctuations in the indication. The recommended ripple value

is less than 30mV.

3. The sensor is based on the electrochemical principle and will be affected by the external environment, such as temperature, humidity, airflow, electromagnetic field, etc. If you need to use it in extreme environments, please pay attention to protecting the sensor.

4. For places where the temperature is high, low or frequently changing, the sensor can be placed in a relatively normal temperature environment, such as 20-25℃, through heating and exhaust devices, so that the sensor can play a better indication.

5. For long-term high humidity or low humidity environment, it may cause changes in the moisture content of the internal electrolyte, thereby reducing the service life, and in severe cases may cause damage.

Therefore, for high humidity environments, waterproof and breathable devices can be added, and drying tubes can also be added to protect the sensor.

6. If the sensor is in an environment with large wind speed changes, it is recommended to add a micro air pump to ensure the stability of the airflow. The recommended flow rate is 0.1-0.5L/min, and the maximum cannot exceed 1.0L/min.

7. The electrochemical sensor has been working since it left the factory and does not change whether it is powered on or not. Therefore, it is recommended that customers use the sensor as soon as possible after

receiving it.

8. The module should avoid contact with organic solvents (including silicone and other adhesives), coatings, pharmaceuticals, oils and high-concentration gases.

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