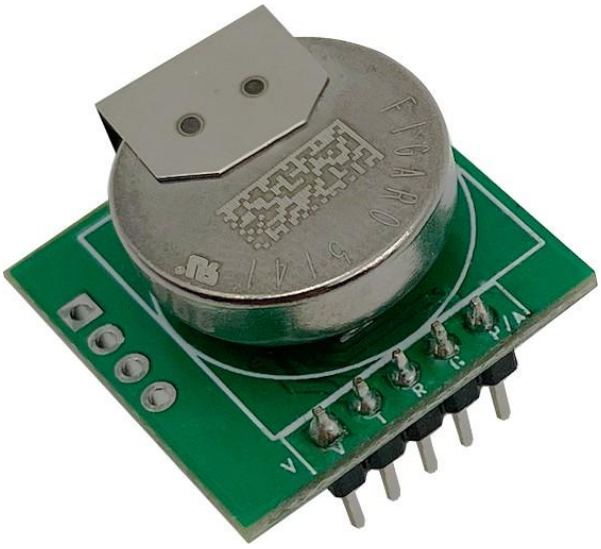
Apollosense®

Carbon Monoxide Sensor

model:AG-4-CO-MS5141(D)

Technical Information



深圳市新世联科技有限公司

地址：深圳市深南中路2066号华能大厦712室
电话：0755-83680810 83680820 83680830 83680860
网址：www.apollounion.com
邮编：518031
传真：0755-83680866
邮箱：sales@apollounion.com

Electrochemical carbon monoxide module AG-4-CO-MS5141(D)

◆ Product Description

AG-4-CO-MS5141(D) electrochemical carbon monoxide module is a general-purpose, miniaturized module. The electrochemicalprinciple is used to detect CO in the air with good selectivity and stability. The module has digital output and analog voltageoutput mode, which is convenient to use. AG-4-CO-MS5141(D) is a general-purposegas module designed and manufactured by closely combiningmature electrochemical detection technology with sophisticated circuit design.

◆ Module features

High sensitivity, high resolution, low power consumption, long service life
High stability, good anti-interference, temperature compensation, excellent linear output
Provide UART/PWM data output, alarm output

◆ Main Application

Portable instruments, air quality monitoring equipment, air purifiers, fresh air ventilation systems, air conditioners, smart home equipment, etc.

◆ Technical Indicators

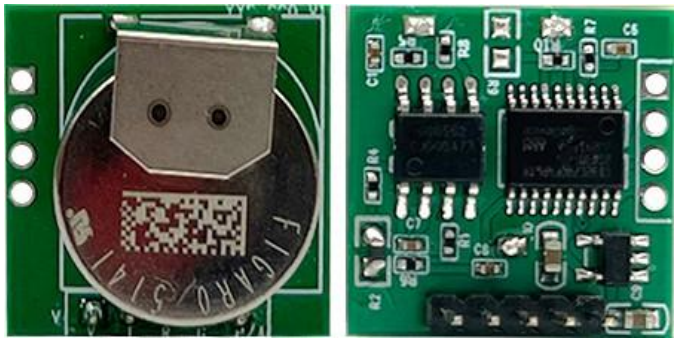
Table 1

Product Model	AG-4-CO-MS5141(D)
Detection gas	carbon monoxide
Output data	UART/(PWM or alarm) output (3.3V level)
Working voltage	4.2V～5.5V
Warm-up time	≤3 minutes
Response time	≤30 seconds
Range	0～1000ppm(extendable to 2000）
Resolution	≤1ppm
Working temperature	-10℃～40℃
Working humidity	15%RH-90％RH(non-condensing)
Storage temperature	-20℃～60℃
Service life	5 years (0℃～35℃ in air)
Module size	Length16mm×width16mm×height7mm

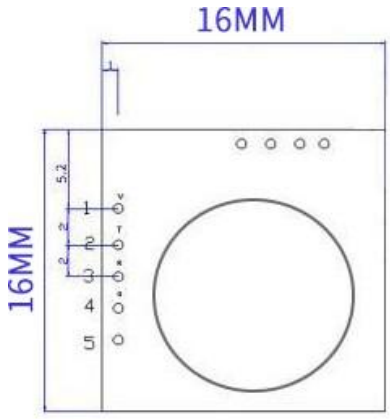
深圳市新世联科技有限公司

地址：深圳市深南中路2066号华能大厦712室
电话：0755-83680810 83680820 83680830 83680860
网址：www.apollounion.com
邮编：518031
传真：0755-83680866
邮箱：sales@apollounion.com

◆ Appearance size and pin definition



Pin Name	Pin Description
Pin1	Vin(voltage input 3.7V～5.5V)
Pin2	UART (TXD) 0～3V data output
Pin3	UART (RXD) 0～3V data input
Pin4	GND
Pin5	PWM or alarm (choose one of two. Factory setting)



Module pin diagram

◆ Communication protocol

1、General settings

Table3

Baud rate	9600
Data bits	8 bits
stop bit	1 bit
Check Digit	None

2、Communication command

Communication is divided into active upload type and question and answer type. The factory default is active upload, and the concentration value is sent every 1S.
The display format of actively uploaded data is as follows:

Table 4

Byte0	Byte 1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte 8
Start bit	gas name (CO)	unit (PPM)	NC	gas concentration high	gas concentration low	alarm concentration high	alarm concentration low	check value
0xFF	0x18	0x04	XX	0x00	0x25	XX	XX	SUM

Notes： 1）Gas concentration value (PPM)=(gas concentration high position *256+ gas concentration low position).

When the user needs the question and answer mode, they can send the following command . Once sent, the active upload will be automatically closed. It needs to be powered on again to restore to automatic upload

The command is as follows:

0XFF 0x01 0x86 0x00 0x00 0x00 0x00 0x00 0x79

Return data (the format is the same as active upload)

Table 5

Byte0	Byte 1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start bit	gas name (CO)	unit (PPM)	NC	gas concentration high	gas concentration low	alarm concentration high	Alarm concentration low	check value
0xFF	0x18	0x04	XX	0x00	0x25	XX	XX	SUM

Gas Concentration Value (PPM)=(Gas Concentration High*256+ Gas Concentration Low).

3、Alarm Output

Alarmsystem:

Send: C0 03 03 DF1 DF2 CS

Answer: 16 01 03 DF1 DF2

Function: CO concentration alarm settings

Illustrate:

1、 alarm value = DF1*256 + DF2. The unit is ppm, the range is (20 to 900 ppm)

E.g:

When you need to set the module alarm point to 150ppm, send the command: C0 03 03 00 96 CS (CS is the checksum)

Hexadecimal to decimal conversion: 00 is 0; 96 is 150

CO alarm value = 0*256 + 150=150ppm

Pin 5 can be used as an alarm output. When the CO concentration is greater than the set value, the 5th pin outputs a high level. When it is lower than the set value minus 5. output low level.

For example: set the value to 150.

When the CO concentration is 0~149, the output is low. When it is greater than or equal to 150, it outputs a high level.

When CO is greater than the set value, it becomes a high level. When the value drops slowly again, it will not output a low level immediately when it is less than the set value. It needs to fall back to 140 before outputting a low level.

4、Checksum calculation

Checksum = (Inverse(Byte1+Byte2+...+Byte7))+1

The reference routine is as follows:

```
/************************************************************
********
* Function name: unsigned char FucCheckSum(uchar *i,ucharln)
* Function description: sum check (invert the sum of 1\2\3\4\5\6\7 of the
  sending and receiving protocols +1)
* Function description: Add the elements 1 to the penultimate element of the
  array and then negate +1 (the number of elements must be greater than 2)
************************************************************/
```

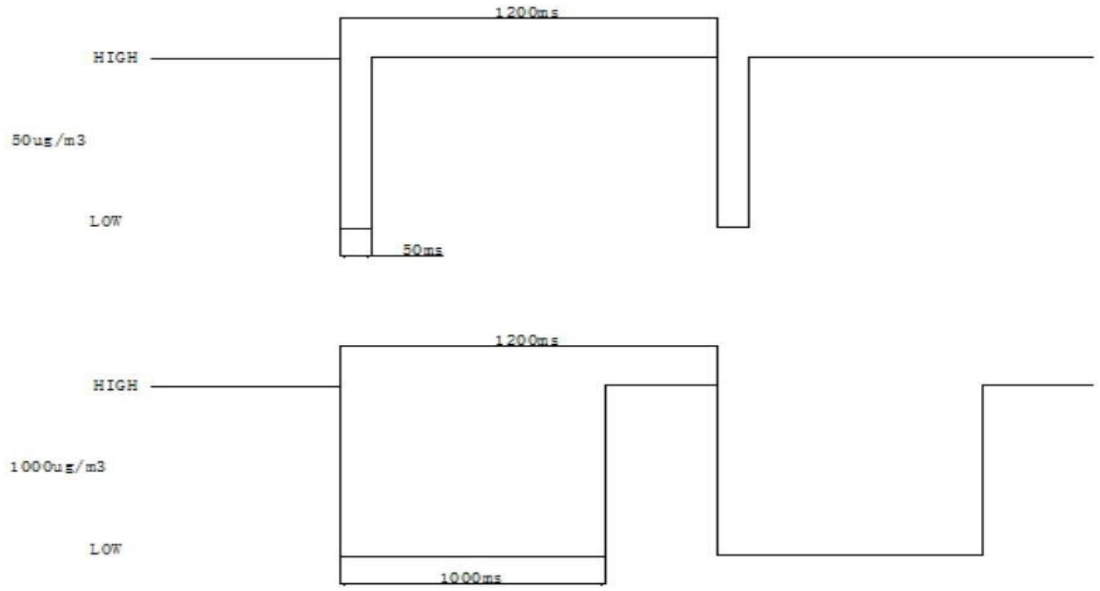
```
unsigned char FucCheckSum(unsigned char *i,unsigned char ln)
{
unsigned char j,tempq=0; i+=1;
for(j=0;j<(ln-2);j++)
  {
    tempq+=*i; i++;
  }
tempq=(~tempq)+1; return(tempq);
  }
```

5、 PWM output (two output methods: PWM or UART, selected at the factory)

The sensor outputs a PWM signal through the PWM port (pin 5), the PWM period is 1.2S, and the dust concentration value is calculated according to the low level width.

For example: the low level width is 50ms, the corresponding dust concentration is 50PPM.

The concentration output range is 0ug/m3 ~ 1000ug/m3.



CO Output Waveform

◆ Notice Matters

■ Electrolyte leakage will cause damage, do not disassemble the sensor at will;;

■ The sensor should avoid contact with organic solvents (including silicone rubber and other adhesives), paints, pharmaceuticals, oils and high-concentration gases;

■ All electrochemical sensors cannot be completely encapsulated with resin materials, nor can they be immersed in an oxygen-free environment, otherwise the performance of the sensor will be damaged;

■ All electrochemical sensors cannot be used in environments containing corrosive gases for a long time, and corrosive gases will damage the sensors;

■ The air inlet surface of the sensor shall not be blocked or polluted;

■ The waterproof and breathable membrane above the sensor is strictly prohibited to be opened or damaged;

■ The sensor should not be subjected to excessive shock or vibration;

■ Please do not use it when the casing is damaged or deformed;

■ After long-term use in a high-concentration gas environment, the sensor recovers slowly to its initial state;

■ It is forbidden to encapsulate the sensor with hot melt adhesive or sealant whose curing temperature is higher than 80℃;

■ It is forbidden to store and use it in high concentration alkaline gas for a long time.

深圳市新世联科技有限公司

地址：深圳市深南中路2066号华能大厦712室
电话：0755-83680810 83680820 83680830 83680860
网址：www.apollounion.com
邮编：518031
传真：0755-83680866
邮箱：sales@apollounion.com