Air-Quality Detection module

(Model ZP16)

Manual

(Version 1.2)

Issue Date: 2023-03-23

Zhengzhou Winsen Electronic Technology Co., Ltd

Statement

This manual's copyright belongs to Zhengzhou Winsen Electronics Technology Co., LTD. Without the written permission, any part of this manual shall not be copied, translated, stored in database or retrieval system, also can't spread through electronic, copying, record ways.

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.

Air-Quality Detection Module

Product Description

The ZP16 air quality module uses an advanced chip thick film semiconductor gas sensitive element. The module has good sensitivity to volatile organic gases such as formaldehyde, benzene, carbon monoxide, ammonia, hydrogen, alcohol and smoke of cigarette, essence & etc. The module has been aging, debugged, adjusted and calibrated. So it has good consistency and high sensitivity.

Features

High sensitivity
Excellent long-term stability
Low power consumption, long life
Calibrated before shipment
High cost-effective

Application

Air cleaner, fresh-air system, intelligent integrated ceiling, air quality detector, ventilator, air-condition.

Technical Index

Table1.

Model No.	ZP16
Detection Gas	formaldehyde, benzene, carbon monoxide, hydrogen, alcohol, ammonia, smoke of cigarette, essence &etc.
Physical Interface	XH2.54-4P terminal sockets
Measurement range	0-10mg/m3
Resolution	0.05mg/m3
Working Voltage	5.0±0.2V DC (No voltage reverse connect protection)
Output	UART(5V)
Working Current	≤60mA
Warm-up Time	3min.
Operating Temperature	0～50℃
Operating Humidity	≤95%RH
Storage Temperature	－20～60℃
Storage Humidity	≤60%RH
Weight	≤20g

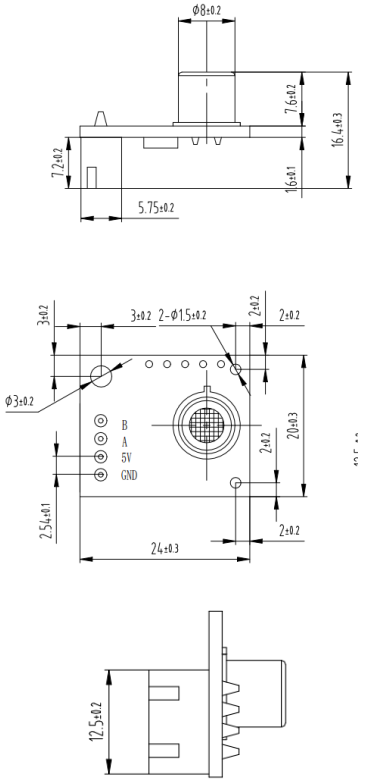

Fig1. Module structure diagram

Pin Definition

Table2.

Name	Function
GND	Input power -
5V	Input power +
A	UART(TX) 0-5V Output
B	UART(RX) 0-5V Input

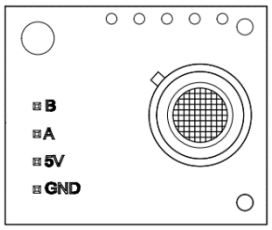

Fig2. Module Pin Diagram

Communication Protocol

1. Serial communication settings

Table3.

Baud rate	9600
Date byte	8 byte
Stop byte	1 byte
Check byte	No

2. Communication command

Communications are divided into active uploads and Q&A. The default communication mode is active upload mode, module sends the concentration value every 1s interval.

If user switches to Q&A mode, and needs to switch from Q&A to initiative upload mode, send command as below:

Table4.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	Switch Command	Active Upload	Reserved	Reserved	Reserved	Reserved	Checksum
0XFF	0X00	0X78	0X40	0X00	0X00	0X00	0X00	0X48

Data format under active upload mode is as following:

Table5.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Gas type	Unit	Decimal point	High byte of gas concentration	Low byte of gas concentration	High byte of full scale	Low byte of full scale	Checksum
0XFF	TVOC 0X34	MG/M3 0X11	0X02	0X01	0XC2	0X03	0XE8	0X0B

Note:

Gas concentration = HIGH byte of gas concentration* 256 + LOW byte of gas concentration.

For example: FF 34 11 02 01 C2 03 E8 0B

Full scale gas concentration = HIGH byte of full scale* 256 + LOW byte of full scale

Gas concentration= 1*256+194=450, decimal point is 02, so concentration= 4.50MG/M3

Full scale gas concentration= 3*256+232= 1000, decimal point is 02, so concentration= 10MG/M3

When the user needs to switch to the Q&A mode, the active upload mode can be turned off by sending the following command. The format of the command line for closing the active upload is as follows:

Table6.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	Switch Command	Q&A	Reserved	Reserved	Reserved	Reserved	Checksum
0XFF	0X00	0X78	0X41	0X00	0X00	0X00	0X00	0X47

Command format of reading concentration, under Q&A mode is as following

Table7.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	Command	Q&A	Reserved	Reserved	Reserved	Reserved	Checksum
0XFF	0X00	0X86	0X00	0X00	0X00	0X00	0X00	0X7A

Return value as below:

Table8.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Command	High byte of gas concentration (MG/M3)	Low byte of gas concentration (MG/M3)	Decimal point	Reserved	High byte of full scale	Low byte of full scale	Checksum
0XFF	0X86	0X01	0XC2	0X02	0X00	0X03	0XE8	0XCA

Note:

Gas concentration = HIGH byte of gas concentration* 256 + LOW byte of gas concentration.

For example: FF 86 01 C2 02 00 03 E8 CA

Full scale gas concentration = HIGH byte of full scale* 256 + LOW byte of full scale

Gas concentration= 1*256+194=450, decimal point is 02, so concentration= 4.50MG/M3

Full scale gas concentration= 3*256+232= 1000, decimal point is 02, so concentration= 10MG/M3

3. Checksum calculation

Checksum = (Negative (Byte1+Byte2+Byte3+Byte4+Byte5+Byte6+Byte7)) + 1

The reference routines are as follows:

```
/*****************************************************************
* The function name: ucharFucCheckSum(uchar *i,ucharln)
* Function description: Sum check (take the sum of 1\2\3\4\5\6\7 of the send and receive protocols and negative +1)
* Function description: the elements of the array 1 - the penultimate element of the sum of inverse + 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);
}
```

Cautions

1. Please do not put the module in organic solvent (include silica gel and other cementing compound), painting, medicament, oils and fuels, high concentration gas etc.
2. Please do not impact or vibrate the module seriously.
3. Please warm up for 5 min before first using.
4. Please do not use the module related with personal safety.
5. Please do not install the module in the severe convection environment.
6. Please do not put in the module in high concentration organic gas for long time.
7. Please do power supply strictly according to specification. If the voltage exceeds 5.5V, the module will be irreversibly damaged.

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