Atmospheric Monitoring Sensor Module

（Model: ZEHS04）

Manual

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ZEHS04

Profile

ZEHS04 is a diffusion type multi-in-one module, mounted with atmospheric monitoring module ZE12A, to detect CO, SO2, NO2, and O3. It is also compatible to connect with dust sensor module, temperature and humidity sensor module externally.
With TTL or RS485 output, it is convenient to use and debug, which greatly shortens the user's design and development cycle, and meets customers' needs for different gas detection occasions.

Feature

High sensitivity, high resolution, long lifespan;

UART or RS485 output;

High stability, good anti-interference ability, excellent linear output;

Application

Urban atmospheric environmental monitoring;

Unorganized emissions of pollution monitoring at factory sites;

Portable instruments, air quality monitoring equipment, and smart home equipment.

Specification

Model	ZEHS04
Target Gas	CO, SO2, NO2, O3 (PM2.5, PM10, temperature and humidity expansion compatible)
Output	UART(3V TTL, 5V compatible), RS485
Working voltage	DV 9~24V
Response time	≤ 120S
Resume time	≤ 120S
Resolution	≤ 10ppb
Working Tem.	-20～50℃
Working Hum.	15~90% RH(no condensation)
Storage Tem.	-20～50℃
Lifespan	2 years(based on sensor lifespan)
Power consumption	≤ 1W
Size	10x12x6cm(Lx Wx H)

Table 1: performance parameter

Detection Range

Item	Condition	Type	Range	Accuracy
1	Temperature: -20℃~50℃	PM2.5/PM10	0-1000ug/m3	Below 100ug/m3: ±(10+10%*Reading value) Above 100ug/m3: ±15%*Reading value
2	Humidity: 15%RH-90％RH	CO	0-12.5ppm	±5%F.S.
3		SO2	0-2ppm	±5%F.S.
4		NO2	0-2ppm	±5%F.S.
5	Pressure: 86kPa～106kPa	O3	0-2ppm	±5%F.S.
6		Temperature	-40℃~100℃	±1℃
7		Humidity	0-100%RH	±5%RH

Communication Protocol

1. General Settings

Table 3

Baud Rate	9600
Data Byte	8 bits
Stop Byte	1 bit
Check Byte	Null

2. Communication Commands

Default settings is initiative upload mode. Modules upload gas concentration value every other 1S,

Table 4

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
Start Byte	Mixed Gas	Unit (ug/m3)	CO (High Byte)	CO (Low Byte)	SO2 (High Byte)	SO2 (Low Byte)	O3 (High Byte)	O3 (Low Byte)	NO2 (High Byte)
0xFF	0x40	0x14	0x03	0xC8	0x00	0x22	0x00	0x78	0x00
Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19
NO2 (Low Byte)	PM2.5 (High Byte)	PM2.5 (Low Byte)	PM10 (High Byte)	PM10 (Low Byte)	Temp. (High Byte)	Temp. (Low Byte)	Humid. (High Byte)	Humid. (Low Byte)	Check Byte
0x37	0x00	0x18	0x00	0x20	0x02	0xA2	0x01	0x65	0x24

Note: convert hexadecimal to decimal before calculation;

Gas concentration value = Gas (high byte)*256+ Gas (low byte)

Temperature value= (Temp. high byte*256+ temp. low byte - 500)*0.1

Humidity value= (Humid. high byte*256+ temp. low byte)*0.1

If pumping function is added, the pump is activated by default. The command format for shutting down the pump is as following:

Stable5.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	command	Shut down	Reserved	Reserved	Reserved	Reserved	Check value
0xFF	0x01	0x96	0x41	0x00	0x00	0x00	0x00	0x28

To open the pumping function: **Stable6.**

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	Command	Open	Reserved	Reserved	Reserved	Reserved	Check value
0xFF	0x01	0x96	0x40	0x00	0x00	0x00	0x00	0x29

Checksum and calculation

```
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);
}
```

Shell suggestion:

1. The peripheral structure must be water-proof. The front and back sides of casing, need to be opened to ensure that the air can diffuse freely for testing.

2. The module is provided with a fixing hole that it can be fixed to the outer casing through the fixing hole.

3. If it's pumping type, there should be a hole with 3mm or more diameter, on the casing, to facilitate the air pipe to draw out the outside air.

Cautions:

1. Please do not use the modules in systems which related to human being's safety.

2. Please do not expose the modules in high concentration organic gas for a long time.

3. Sensor shall avoid organic solvent, coatings, medicine, oil and high concentration gases.

4. The module should be charged for over 24hours for the first time, and supply circuit should be equipped with power reservation function. Otherwise, it will affect continuity and accuracy of returned data if it goes offline for too long. If the power offline time is within half an hour, it needs to be aged for at least 2 hours.

5. It is recommended to keep the sensor aging and turn off the pump to save power, as well as extend the pump life and ensure the sensor data accuracy, when the module is not tested.

6. According to communication protocols, it is necessary to check whether byte0, byte1 and check value are correct after receiving the data, thus to ensure correctness of receiving data frames.

7. It is suggested to use USB - convert - TTL tools and UART debug assistant software, and observe based on communication protocols to judge whether module communication is normal.