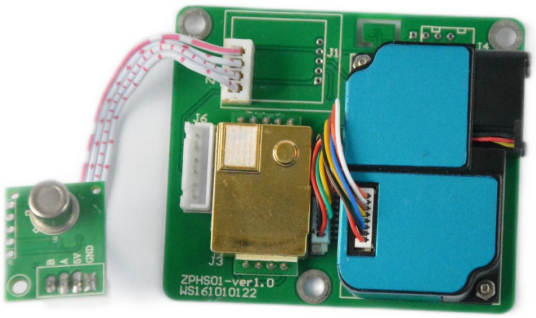

Winsen ZPHS01C Multi-in-one Sensor Module Instruction Manual

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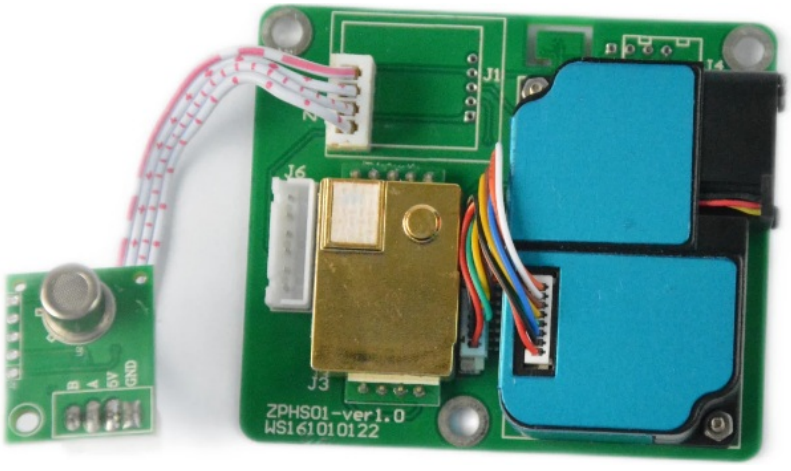

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We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.
Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Multi-in-One Sensor Module

Profile

This module integrates Electrochemical formaldehyde, Semiconductor VOC sensor, Laser particle sensor, NDIR CO2 sensor and temperature& humidity sensor. (Users could choose CH2O version or VOC version, they are not concomitant.)
Communication Interface: TTL serial/RS485, Baud rate:9600, data bit:8, stop bit:1, parity bit: none.

Application

- Gas detector Air conditioner Air quality monitoring
- Air purifier HVAC system Smart home

Specification

Model	**ZPHS01C**
Target Gas	PM2.5, CO2, CH2O, TVOC,Temperature&Humidity
Interference gas	Alcohol/CO gas…etc.
Working voltage	5V (DC)
Average Current	500 mA
Interface level	3 V(compatible with 3.3V)
Output signal	UART/RS485
Preheat time	≤ 3min
CO2 range	400~5000ppm
PM2.5 range	0~1000ug/m3
CH2O range	0~1.6ppm
TVOC range	4 grades
Tem. range	0 65℃
Tem. precision	±0.5℃
Hum. range	0~100% RH
Hum. precision	±3%
Working Tem.	0 50℃
Working Hum.	15~80% RH(no condensation)
Storage Tem.	0 50℃
Storage Hum.	0~60% RH
Size	62.5mm (L) x 61mm(W) x 25mm(H)

Table 1: performance parameter

Module Appearance

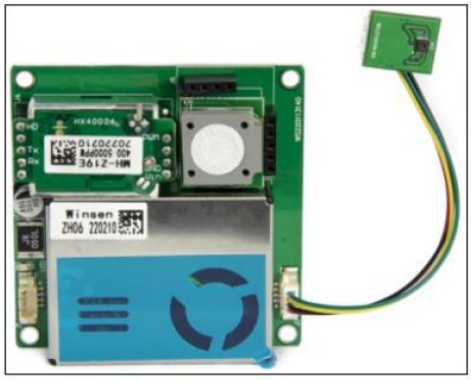

Fig1 : CH2O version

Fig2 : VOC version

Module size

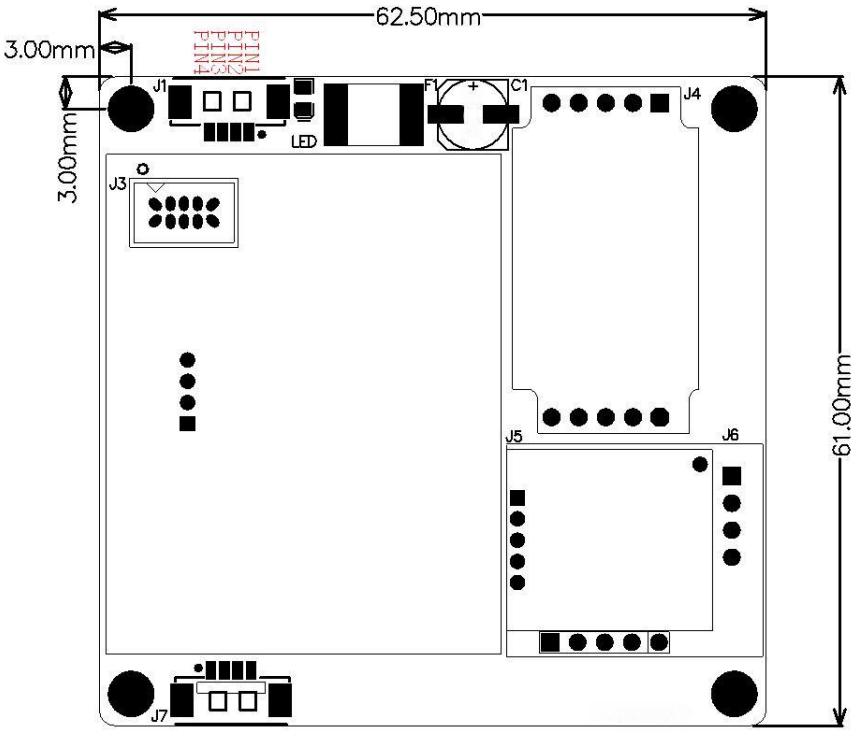

Fig 3: Mounting dimension

Pin Definition

- PIN1 GND Power input (Ground terminal)
- PIN2 +5V Power input (+5V)
- PIN3 RX serial port (serial port receiver for modules)
- PIN4 TX serial port (serial port sender for modules)

Serial communication protocol format

The host computer sends the format

Start character	length	Command number	Data 1	……	Data n	checksum
HEAD	LEN	CMD	Data 1	……	Data n	CS
11H	XXH	XXH	XXH	……	XXH	XXH

Detailed protocol format

Protocol format	Detailed explanation
Start character	Upper PC send [11H] Module responses [16H]
Length	Frame byte length = data length+1 includes CMD+DATA
Command No	Command number
Data	Data read or written, with variable length
Checksum	Inverse of the sum of data accumulation

Serial protocol command number table

NO.	Function	Command NO.
1	To read the measure result	0x01
2	CO2 calibration	0x03
3	Start/Stop dust measurement	0x0C

Detailed description of protocol

Active upload mode: **To send:** 11 02 01 00 EC **Response 16** 0B 01 01 9A CO2	00 67 VOC/CH2O	01 EA Humidity	03 04 Temperature	00 36 PM2.5	B4 CS

Q&A mode:

- **To send:** 11 02 02 00 EB
- **Response 16** 0B 01 01 9A 00 67 01 EA 03 04 00 36 00 3C 00 20 B4
  CO2 VOC/CH2O Humidity Temperature PM2.5 PM10 PM1.0 CS

Identifying	Decimal valid range	Corresponding value	multiple
CO2	400~5000	400~5000ppm	1
VOC	0~3	0~3 level	1
CH2O	0~2000	0~2000μg/m3	1
PM2.5	0~1000	0~1000ug/m3	1
PM10	0~1000	0~1000ug/m3	1
PM1.0	0~1000	0~1000ug/m3	1
Temperature	500~1150	0~65℃	10
Humidity	0~1000	0~100%	10

1. The temperature value increases 500 from the actual measurement results, that is, 0 ℃ is corresponding to the number of 500.
   Temperature value = (DF7*256+DF8-500)/10
2. The measured value is represented by two bytes, the higher byte in front while the lower byte in the back.
3. After sending the inquiry command, if the response is received, the module will upload the data every second automatically. There is no need to repeat the command before the power is turned off.

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);
}
```

CO2 zero point(400ppm) calibration

- **To send 11** 03 03 01 90 58
- **Response 16** 01 03 E6
- **Function CO2** zero point calibration
- Instruction: zero point means 400ppm please ensure that the sensor has already been working for 20 mins at least at 400ppm concentration level before sending this command.

Start & Stop dust measurement

- **Send 11** 03 0C DF1 1E C2
- **Response 16** 02 0C DF1 CS
- **Function Start/Stop** dust measurement
- **Instruction**
  1 Among send command, DF1=2 means starting measurement DF1=1 means stopping measurement; 2 Among response command, DF1=2 means starting measurement, DF1=1 means stopping measurement; 3

When the sensor receives the measurement command, it enters the state of continuous measurement by default.

- **Send 11** 03 0C 02 1E C0 //start dust measurement
- **Response 16** 02 0C 02 DA //the module is in “on-state dust measurement”
- **Send 11** 03 0C 01 1E C1 //stop dust measurement
- **Respond 16** 02 0C 01 DB //the module is in “off-state dust measurement”

Cautions

1. The PM2.5 sensor on this module is suitable for the detection of dust particles in ordinary indoor environments. The actual use environment should try to avoid soot environment, excessive dust particles, high humidity environment, such as: kitchen, bathroom, smoking room, outdoor, etc. If used in such an environment, appropriate protective measures should be added to prevent viscous particles or large particles from entering the sensor, forming a buildup inside the sensor, and affecting the sensor’s performance.
2. The module should avoid contact with organic solvents (including silica gel and other adhesives), coatings, pharmaceuticals, oils and high-concentration gases.
3. The module cannot be completely encapsulated with resin material, and it cannot be immersed in an oxygen-free environment, otherwise the performance of the sensor will be damaged.
4. The module cannot be used in the environment containing corrosive gas for a long time. Corrosive gas will damage the sensor.
5. The module needs to be warmed up for more than 3 minutes when it is powered on for the first time.
6. Do not use this module in systems involving personal safety.
7. Do not use the module in narrow room, the environment should be ventilated well.
8. Do not install the module in a strong convection air environment.
9. Do not place the module in high-concentration organic gas for a long time. Long-term placement will cause the sensor zero point drift and slow recovery.
10. It is prohibited to use hot-melt adhesive or sealant to seal the module with a curing temperature higher than 80℃.
11. The module should be away from the heat source, and avoid direct sunlight or other heat radiation.
12. The module can’t be vibrated or shocked.

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Documents / Resources

	**Winsen ZPHS01C Multi-in-one Sensor Module** [pdf] Instruction Manual ZPHS01C, Multi-in-one Sensor Module, ZPHS01C Multi-in-one Sensor Module, Sensor Module

References

- **Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics**

Manuals+,