Product Specification

Model: XH-ID-01

Version: 1.0

Date: 1st.1, 2025

Taiyuan Tengxing sensor technology Co., Ltd

Declaration

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Shanxi Tengxing sensor technology Co., Ltd

1. Performance

The integrated point laser methane sensing probe uses Tunable Laser Spectral Absorption (TDLAS) technology to accurately measure the target gas. The sensor probe integrates advanced lasers and detectors to achieve high-precision, high-density, and high-reliability miniaturized integrated package; the sensor probe adopts an open gas exchange method, and at the same time uses unique technology to ensure photoelectric segmentation and ensure the inherent safety of the sensor probe; the sensor probe adopts excellent optical systems and excellent algorithms to achieve high difficulty and accurate measurement, ensuring the advantages of high detection accuracy, fast reaction, and low power consumption of the sensor probe.

2. Characteristic:

(1) High precision, miniaturization, low power consumption

(2) Long effective absorption path, achieving a long effective absorption path in small optical systems

(3) Powered by wide operating voltage (3.3V~5.0V) TTL serial port for

easy secondary integration

(4) Intrinsically safe explosion-proof design, EMC protection design

(5) Waterproof and dustproof design

3. Main applications:

(1) Petroleum, chemical industry, mining

(2) Coal mine safety monitoring

(3) Underground integrated pipeline corridor, gas leakage monitoring, biogas monitoring

(4) Natural gas pipelines, transmission stations, gas filling stations

(5) Pipeline leakage monitoring and household natural gas leakage

(6) monitoring other related safety monitoring and testing areas

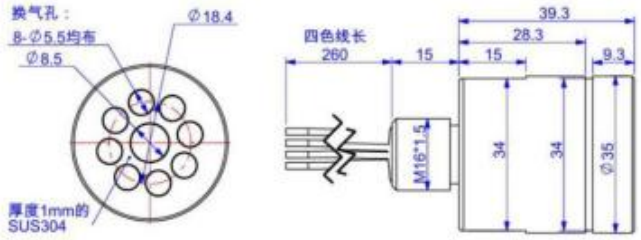
4. Technical parameters (for reference only):

Parameter		Mix values	Typical values	Max values	Unit
General parameters					
Storage temperature		-40	——	85	℃
Operating temperature	82010521-04	-10	——	50	℃
	82010521-05		——		
	82010521-06	-40	——	70	
	82010521-07		——		
Operating humidity (non-condensing)		——	——	98	%RH
Working pressure		80	——	116	kPa
Detection range		0	——	100	%vol
Basic error		0-1.00%vol		±600ppm	——
		(1.00~100)%vol		True value±6%	——
Response time		-	15	-	s
		0.01			%vol
Communication interface					
TTL	Baud rate	——	9600	——	baud
	Stop bit	——	1	——	Bit
	Data bit	——	8	——	Bit
	Calibration bit	——	——	——	Bit

Electrical properties (room temperature)				
Operating voltage	3.3	3.6	50	V
Operating current (average)	——	30	——	mA
Operating current (instantaneous)	——	250	320	mA
Size				
Diameter* long	Φ39.3 x 54.3(Not including matching parts)			mm

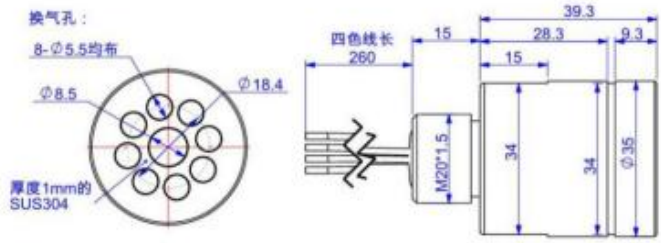
5. Product appearance and lead definition

82010407-01 Size diagram and wire definition:



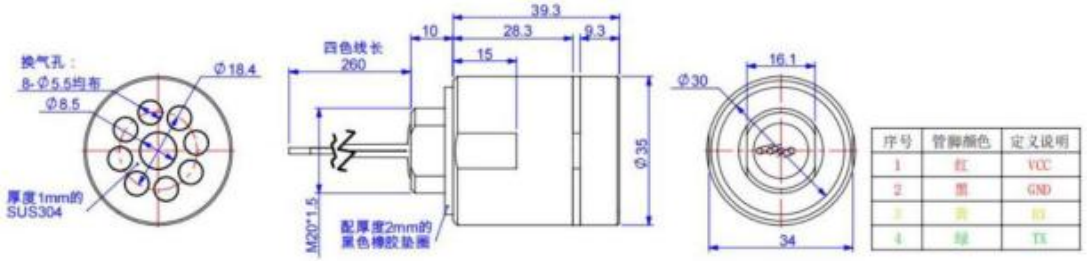
序号	管脚颜色	定义说明
1	红	VCC
2	黑	GND
3	黄	RX
4	绿	TX

82010407-02 Size diagram and wire definition:



序号	管脚颜色	定义说明
1	红	VCC
2	黑	GND
3	黄	RX
4	绿	TX

82010407-03 Size diagram and wire definition:



序号	管脚颜色	定义说明
1	红	VCC
2	黑	GND
3	黄	RX
4	绿	TX

6. Serial port communication protocol (82010407-01/-02/-03)

6.1 Communication port configuration

The probe communicates with the outside through the serial port, and the communication interface is configured as follows:

Configuration Items	Parameter
Baud rate	9600
Stop position	1
Data bits	8

Check bit	Non
Flow control	Non

6.2. Data output format

6.2.1 When the probe is in the detection state, it will be output actively; other states require the host to send relevant commands before the component can reply.

When the probe is in the detection state, the active output form is ACSII string fixed-length output, with a total of 29 characters, and the specific format is as follows:

Function code		concentration	Spaces	temperature	Spaces	pressure	Spaces	Fault code	Spaces	XOR verification code	Spaces	Line breaks
Byte number		1-7	8	9-13	14	15-21	22	23-24	25	26-27	28	29
Number of byte bits		7	1	5	1	7	1	2	1	2	1	1
Unit		%VOL	-	℃	-	mbar	-	-	-	-	-	-
Example	ASCII	+000.00	〈SP〉	+21.4	〈SP〉	1001.01	〈SP〉	00	〈SP〉	28	〈CR〉	〈LF〉
	HEX	2B 30 30 30 2E 30 30	20	2B 32 31 2E 34	20	31 30 30 31 2E 30 31	20	30 30	20	32 38	0D	0A

6.2.2 Description of the method of XOR verification:

The calculation method is to perform XOR calculation one by one from the first byte. That is, the first byte is exclusive or the second byte, the result is then exclusive or the third byte, and so on until the first 25 bytes ends, and a check result of one byte is obtained, and the result is converted into two-character output. For example, if the calculation result is 0X28, the characters ‘2’ and ‘8’ are the output results. If the characters contained are letters, the output is in capital form.

For example:

The current concentration is 0.00%VOL, the temperature is 21.4℃, the pressure is 1001.01mbar, and the output is as follows:

+000.00 +21.4 1001.01 00 28<CR><LF>

The current concentration is 2.01%VOL, the temperature is -9.4℃, the pressure is 989.12mbar, and the output is as follows:

+002.01 -09.4 0989.12 00 2D<CR><LF>

6.2.3 Status code description:

In the default mode output, bytes 23 and 24 are status codes represented by ASCII code, representing the working status of the probe. Convert two ASCII code bytes into the corresponding BCD code, that is, each byte is converted into a 4-bit hexadecimal data, convert the 23rd byte ASCII code into a BCD code to form a high 4 bits, and convert the 24th byte ASCII code into a lower four bits. A total of 8 data bits are one byte. Each bit represents a different fault, specifically:

Byte 23				Byte 24			
D8	D7	D6	D5	D4	D3	D2	D1
reserve	Temperature control abnormal marking	Temperature and pressure sensor communication abnormality mark	Whether to calibrate the flag	Light intensity is too small	The light intensity is too large	Whether the absorption peak is out of the mark	reserve
Default is 0	1: Temperature control abnormality 0: Normal	1: Communication abnormality 0: Normal	1: Not calibrated 0:Calculated	1: Too small 0: Normal	1: Too big 0: Normal	1: Offset 0: Not biased	Default is 0

For example:

a. The product works normally: the output status code is 00 at this time, and the ASCII code corresponding to byte 23 is 0X30 and its corresponding

The BCD code is B0000, the ASCII code corresponding to the 24th byte is 0X30 and its

corresponding BCD code is B0000, and the corresponding flag bit is: B0000 0000.

b. If the absorption peak is biased: the output status code is 02 at this time, and the corresponding 23-byte ASCII code is 0X30 and its corresponding

The BCD code is B0000, the ASCII code corresponding to the 24th byte is 0X32 and its corresponding BCD code is B0010, and the corresponding flag bit is: B0000 0010.

c. If the temperature control is abnormal and the light intensity is too high at the same time: the output status code is 44 at this time, the ASCII code corresponding to byte 23 is 0X34 and its corresponding BCD code is B0100, the ASCII code corresponding to byte 24 is 0X34 and its corresponding BCD code is

B0100, the corresponding flag is: B0100 0100

d. If the temperature control is abnormal, the temperature pressure sensor communication is abnormal, the product is not calibrated, the light intensity is too small, and the absorption peak is biased: the output status code is 7A at this time, the ASCII code corresponding to byte 23 is 0X37 and its corresponding BCD code is B0111, the ASCII code corresponding to byte 24 is 0X41 and its corresponding BCD code is B1010, and the corresponding flag bit is: B0111 1010.

6.3. Zero data protocol

Host fixed sending: 0x3a 0x31 0x00 0x00 0x31 0x0d 0x0a

Component zeroing successfully postback: 0x3a 0x32 0x01 0x33 0x0d 0x0a

Element zeroing failed postback: 0x3a 0x32 0x00 0x32 0x0d 0x0a

Description: Zero is adjusted below the current concentration output value. The factory default is clear below 600ppm.

6.4. Calibration data protocol:

Host fixed sending: 0x3a 0x33 data1 data2 sum 0x0d 0x0a Component calibration successfully postback: 0x3a 0x34 0x01 0x35 0x0d 0x0a

Component calibration failed postback: 0x3a 0x34 0x00 0x34 0x0d 0x0a

Note: data1 and data2 are signed 16-bit integers, 100 times the actual data, Data1 is the upper 8 bits, and Data2 is the lower 8 bits.

like:

If you need to send 5.43%, the actual sending is 543, that is, Data1=0x02,

Data2=0x1F

If you need to send 54.3%, the actual sending is 5430, that is, Data1=0x15,

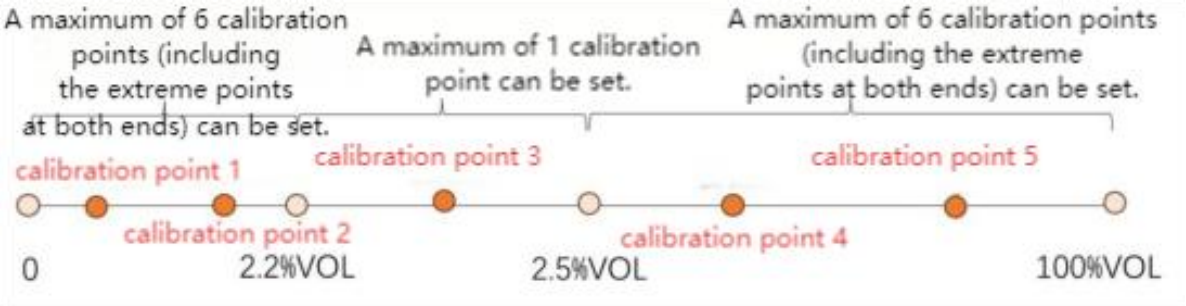
Data2=0x36

illustrate:

a. As shown in the figure below, up to 13 calibration points can be set within the full concentration range;

a. Restore factory zero value;

b. Clear calibration-related parameters.



b．(0x33 + data1 + data2)&0xFF=sum.

6.5. Restore factory settings:

Host fixed sending: 0x3a 0x35 0x00 0x00 0x35 0x0d 0x0a

Component setting successfully postback: 0x3a 0x36 0x01 0x37 0x0d 0x0a

Component setting failed postback: 0x3a 0x36 0x00 0x36 0x0d 0x0a

Note: After factory reset, the following parameters will be changed:

a. Restore factory zero value;

b. Clear calibration-related parameters.

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