

TDLAS103 Laser Methane Sensor

Introduction

The 3.3V laser methane sensor is developed based on the tunable laser gas absorption spectroscopy (TD-LAS), which uses 1653.7nm laser to detect methane gas by characteristic "fingerprint spectrum" absorption, and is resistant to water vapor or other gas interference. Based on the combination of direct absorption and wavelength modulation absorption spectroscopy technology, and the "N" type optical path structure design, long absorption optical path, high detection sensitivity and precision; Choose the low temperature performance of laser and photoelectric detector devices and temperature compensation correction algorithm with wide temperature, environmental adaptability is strong; Standard thread installation interface and standard communication protocol design, strong commonality. As the core component of methane gas monitor, the product can be widely used in underground space, catering industry, industrial chemical industry and coal mine and other fields of methane gas leakage detection alarm.

Feature

- **High detection accuracy**

Direct and wavelength modulation technology combined with folded optical path design, measurement error $\leq \pm 6\%$ true value @25°C

- **Good environmental adaptability**

Wide temperature compensation correction algorithm, can meet -40~+70°C application

- **Strong anti-interference**

Methane "fingerprint spectrum" laser absorption detection technology, anti-poisoning, anti-water vapor and other gas interference;

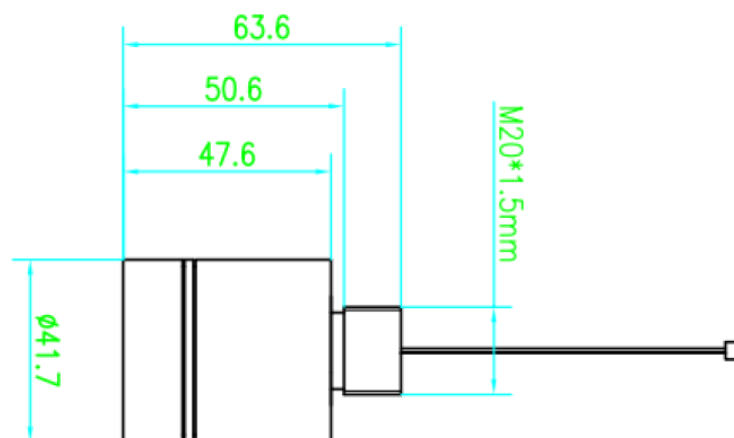
- **Strong structural protection**

Stainless steel material design, meets the explosion-proof level Exia IIC T6 Ga

- **Low cost**

Long service life, low power consumption, modular design, easy to integrate

Dimension



Technical Specifications

Parameters	Technical Indicators
Measuring gas	Methane
Measuring principle	TD-LAS
Detection mode	Dispersive
Measuring range	0-20% VOL (customizable)
Measurement error @25℃	<+0.06%VOL,0-1%VOL <+6%True value,1-20% VOL
Lower detection limit	0.2% VOL
Minimum resolution	0.01% VOL
Response time	T90<15s
Operating voltage	3.0VDC ~3.6VDC
Average operating current	<30mA
Peak current	<210mA
Output mode	Standard TTL serial port
Operating temperature	-40℃~ +70℃
Operating humidity	0 ~ 99% RH (condensation)
Explosion proof sign	Ex ia IICT6 Ga
Intrinsic safety parameter	Ui:3.3V Ii:50mA Pi:0.250W Ci:20uF Li:3.14uH
Protection degree	IP66
Product weight	255g
Products dimensions	φ 41.7mmx63.6mm

Application

- a) The sensor continuously outputs the measured methane concentration, measured temperature, measured pressure, laser signal strength, laser operating temperature and fault code through the standard TTL serial port
- b) It has a self-test function, which can detect whether the laser, photoelectric detector and voltage stabilization sensor are normal, which helps to eliminate the fault point.

Communication Interface and Definition

Interface form: SH1.0mm/4P

Cable length: 200mm

Number	Color	Interface definition
1	Red	VCC
2	Black	GND
3	Blue	RX
4	Green	TX

Communication Protocol

(1) Communication interface configuration

UART serial port: Baud rate: 115200, data bits: 8 bits,

Stop bit: 1 bit, parity bit: no check

(2) Description of communication protocol

Byte sequence number	Function code	Byte number	Unit	Example
0	Head of frame	1	-	A
1-7	Concentration	7	%VOL	+000.00
8	Blank space	1	-	<SP>
9-13	Ambient temperature	5	°C	+23.7
14	Blank space	1	-	<SP>
15-21	Ambient air pressure	7	hPa	1006.22
22	Blank space	1	-	<SP>
23-27	Intensity of light	5	-	+16.1
28	Blank space	1	-	<SP>
29-35	Gain coefficient	7	-	B+6.0
36	Blank space	1	-	<SP>
37-38	Fault code	2	-	00
39	Blank space	1	-	<SP>
40-41	Xor check code	2	-	3D
42	Carriage return character	1	<CR>:	<CR>:
43	Line break character	1	<LF>	<LF>

After the sensor is powered on, it goes through a period of preprocessing (6-10s) and then begins to periodically (1Hz) output a fixed-length string. The string format is shown in the figure above.

Output string parsing (sample):

A 000.00 + 24.0 + 1006.22 + 16.1 + 006.0 B 00 13

A: the frame head;

+000.00: methane concentration value, two decimal places reserved, unit %vol;

+ 24.0: the environment temperature, the unit °C;

1006.22: the environment pressure, the unit hPa;

16.1: the laser light intensity and effective range 3.6 21.6;

006.0: magnification factor, normal range 1.0-126.0;

00: fault codes

01: abnormal optical signal; 02; Ambient temperature or abnormal pressure; Optical signal is too strong;

04 laser temperature anomaly;

05: light signal is too weak;

13: xor check code

Fault Code

Fault code	Meaning	Fault code	Meaning
0	Sensor working properly	3	The laser signal is strong
1	The photodetector signal is abnormal	4	Laser temperature anomaly
2	Temperature and pressure sensor abnormal	5	The laser signal is too weak

Precautions

- a) The working voltage of the sensor is 3.3V, and the serial interface level is 3.3V;
- b) sensor contains precision optical components, please avoid violent collision;
- c) Working environment conditions: -40℃ ~ +70℃
- d) Relative humidity 0-99% RH (non-condensation).

Note: The working voltage of the sensor is 3.3V. It is forbidden to connect the power supply voltage exceeding 3.6VDC to the sensor to avoid damage to the sensor.