MST LS4 Series

Laser Methane Sensor

product description ：

The LS4 series laser methane sensor is a high-precision, miniaturized gas sensor designed based on Tunable Diode Laser Absorption Spectroscopy (TDLAS) technology. It features small size, low power consumption, stable performance, long service life of sensor components and high sensitivity.

Sensor features:

- Good stability, no calibration required;
- Unique selectivity to methane, not interfered by other gases, water vapor or dust;
- Fast response speed, wide measurement range and high measurement accuracy;
- Shockproof, waterproof and dustproof performance;
- TTL serial port and analog signal dual output;

product specification：

project	parameter
Object gas	Methane
Sampling Method	Diffusion
Test Principle	TDLAS
Response time	≤20S
Range	0-1%VOL（10000ppm） / 0-5%VOL / 0-100%VOL
Accuracy	0-1% ±0 . 03%VOL
	1%-100% ±5% of true value (VOL)
Display resolution	0. 01%VOL
Expected life	> 5 years
Working temperature	-5℃ to +55℃ (customizable from-40℃ to +70℃)
Humidity at work	<98%RH (no condensation)
Working pressure range	86Kpa～106Kpa
Working voltage	3V-5 . 5V

project	parameter
Average operating current	<100mA
Communication mode	TTL serial port data and dual 0.4V-2V analog signal outputs
Outer shell material	304 stainless steel
Mechanical dimensions	Φ20mm*16.6mm (diameter* height)
Levels of protection	IP65

Table 1: Room Temperature Linear Test Data

	Standard gas									
	0.00	0.25	0.50	2.50	3.50	5.00	10.00	20.00	50.00	100.00
Number	indicating value									
1	0.00	0.25	0.47	2.45	3.40	4.92	9.89	19.69	49.55	99.61
2	0.00	0.25	0.50	2.50	3.47	5.01	9.99	19.97	49.54	99.39
3	0.00	0.24	0.48	2.47	3.46	5.01	10.02	19.98	49.72	99.91
4	0.00	0.23	0.48	2.50	3.48	5.03	10.06	20.13	50.16	100.03
5	0.00	0.25	0.50	2.49	3.46	5.00	10.04	19.91	49.81	99.87
6	0.00	0.26	0.50	2.48	3.42	4.93	9.92	19.61	48.93	97.81

Table 2 High and low temperature accuracy test data

		Concentration of standard gas 0.5%VOL				Concentration of standard gas 1%VOL				Concentration of standard gas 20%VOL			
Temperatur		0℃	20℃	40℃	55℃	0℃	20℃	40℃	55℃	0℃	20℃	40℃	55℃
Sensor number	1	0.51	0.50	0.52	0.52	1.01	1.00	1.03	1.02	20.19	19.65	19.45	19.60
	2	0.47	0.49	0.52	0.52	0.97	1.00	1.03	1.02	20.05	19.83	19.99	20.31
	3	0.50	0.50	0.52	0.53	0.98	1.00	1.02	1.03	19.83	19.95	20.02	20.20
	4	0.50	0.49	0.49	0.51	1.00	0.99	0.99	1.02	20.30	20.07	20.11	20.21
	5	0.50	0.50	0.50	0.51	1.01	1.01	0.99	1.00	20.61	20.05	19.83	19.89
	6	0.50	0.50	0.50	0.54	1.01	1.01	1.02	1.05	20.04	19.91	19.64	20.14

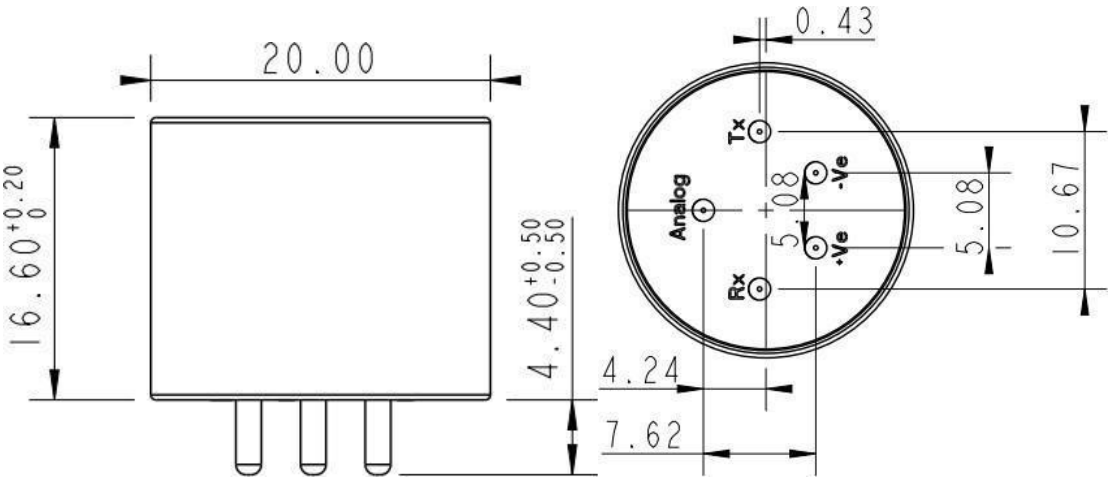
Table 3: Indication Stability and Repeatability

Product number	First time (inflating to 1% VOL, monitor for one minute after stabilization)		Second time (inflating to 1% VOL, monitor for one minute after stabilization)		Third time (inflating to 1% VOL, monitor for one minute after stabilization)	
	Minimum value	Maximum value	Minimum value	Maximum value	Minimum value	Maximum value
1	0.99	1.00	1.00	1.02	0.97	0.98
2	0.98	0.99	0.99	1.00	0.99	1.00
3	0.99	1.00	0.97	0.99	0.98	1.00
4	1.03	1.04	1.00	1.01	1.02	1.04
5	0.99	1.00	1.00	1.01	0.98	0.99

Product number	First time (inflating to 20% VOL, monitor for one minute after stabilization)		Second time (inflating to 20% VOL, monitor for one minute after stabilization)		Third time (inflating to 20% VOL, monitor for one minute after stabilization)	
	Minimum value	Maximum value	Minimum value	Maximum value	Minimum value	Maximum value
1	20.07	20.08	20.05	20.07	20.12	20.14
2	20.04	20.06	20.05	20.08	19.97	19.99
3	19.94	20.01	19.94	20.00	19.94	20.01
4	19.85	19.91	19.96	20.02	19.89	19.91
5	20.07	20.12	20.14	20.15	19.95	20.00

Size and Pin Definition

Standard 4 Series:



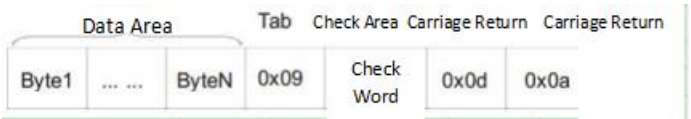
Pin symbol	Description
V+	Power input Voltage range: 3.0V-5.5V DC
Gnd	Power input (ground)
Tx	Serial port, circuit board serial port transmitter
Rx	Serial port, circuit board serial port receiver
DA	Analog Voltage Output Terminal OV Sensor Fault 0.2V sensor preheat status 0. 4-2V corresponds to 0-100% FS, 2.2V indicates over-range.

TTL Serial Port Data Usage Guide

1.Porter rate: 38400

Data Bit: 8; Stop Bit: 1; Parity Bit: None

2. Data Packet Format



1. A data packet is a string composed of ASCII codes.
2. Checksum = 100 (Hex) - (function code + data 1 + ... + data N).For example:

If the calculated checksum is 0x89, the corresponding high byte is 0x38 (ASCII character "8") and the low byte is 0x39 (ASCII character "9").
If the calculated checksum is 0xAC, the corresponding high byte is 0x41 (ASCII character "A") and the low byte is 0x43 (ASCII character "C").

3. F1 Command (Enter F1 Active Transmission Mode)
Instruction: When it is necessary to enter F1 automatic data transmission mode (the sensor is in F1 automatic data transmission mode at factory), send the following command. After receiving the command, the sensor will periodically print and output concentration data automatically (ASCII format, 1 second interval).
Transmit (hexadecimal): 46 31 09 38 39 0D 0A
Response (hexadecimal): 46 31 09 38 39 0D 0A

4. F0 Command (Enter F0 Passive Response Mode, Disable F1 Active Transmission Mode)
Instruction: When it is necessary to disable F1 automatic transmission mode, send the F0 command to enter passive response mode.
Transmit (hexadecimal): 46 30 09 38 41 0D 0A
Response (hexadecimal): 46 30 09 38 41 0D 0A

5. R6 Command (Read Concentration Data, in F0 Passive Response Mode)
Transmit (hexadecimal): 52 36 09 37 38 0D 0A
Response (hexadecimal): 32 2E 35 30 09 33 42 0D 0A
32 2E 35 30 represents the value, corresponding to the ASCII code "2.50%vol".

Transportation and Storage

- The sensor is suitable for various transportation modes (water, land, and air). It must be protected from water and collision during transportation. Severe impact and vibration should be avoided during transportation and installation.
- Unused sensors should be stored in a warehouse at room temperature, away from corrosive gases.

Precautions

- Before use, ensure the power cord is connected correctly and the voltage is normal.
- Do not disassemble or repair the sensor in an explosive gas environment.
- Do not place the sensor near high temperatures or fire sources.
- If using a battery for power supply during testing, the test must be conducted in a safe area.

- It is recommended to use a dedicated adapter for external wiring welding during independent testing.
- For products that have passed explosion-proof inspection, do not arbitrarily replace or modify components and structures that affect explosion-proof performance.
- Installation must comply with the requirements of GB/T 3836.15-2017 Explosive Atmospheres - Part 15: Design, Selection and Installation of Electrical Installations.
- Do not attempt to disassemble or repair the sensor by yourself.

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