



Laser Sensor
(Model: MH-L1141A-U-100L)

Manual

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Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD.

MH-L1141A-U-100L Laser Sensor

Product Description

MH-L1141A-U-100L The integrated point laser methane sensor uses tunable laser spectral absorption (TDLAS) technology to accurately measure the target gas. The sensor probe integrates advanced lasers and detectors to achieve a compact integrated package with high precision, high density and high reliability. The sensor adopts the open gas exchange mode and adopts the unique technology to ensure the photoelectric division and ensure the intrinsic safety of the sensor. The sensor adopts excellent optical system and excellent algorithm to achieve accurate measurement, which ensures the advantages of high detection accuracy, fast response and low power consumption.



Characteristic

- High Sensitivity and resolution, low power consumption, small size
- Long effective absorption path, effective path length up to 9cm
- High reliability, intrinsic anti-interference (no reaction of non-target gas)
- Wide voltage (3.3V~5.0V)
- TTL serial port output, convenient for secondary integration
- safety explosion-proof design, EMC protection design
- Water-proof and dust-proof

Explosive-proof Characteristic

Explosive-proof grade: Ex d IIC T6 Gb/Ex tD A21 IP66 T80°C Manufacturing basis of this product

GB3836.1-2010 《Explosive atmospheres - Part 1: General requirements for equipment》

GB3836.2-2010 《Explosive atmospheres - Part 2: Equipment protected by flameproof housing "d"》

GB12476.1-2013 《Electrical equipment for use in combustible dust environments - Part 1: General requirements》

GB12476.5-2013 《Electrical equipment for use in combustible dust environments - Part 5: Enclosure protected "TDS"》

GB/T 4208-2017 《Enclosure protection Class (IP code)》

GB/T 13384-2008 《Mechanical and electrical products packaging application technical conditions》

Main Application

- Petroleum, Chemical Industry, Mining.
- Natural gas pipelines, transmission stations and filling stations.
- Coal mine safety monitoring.
- Pipeline leak monitoring and domestic natural gas leak monitoring;
- Underground integrated pipe gallery, gas leakage monitoring, biogas monitoring.
- Other related safety supervision and testing fields.

Technical Parameters

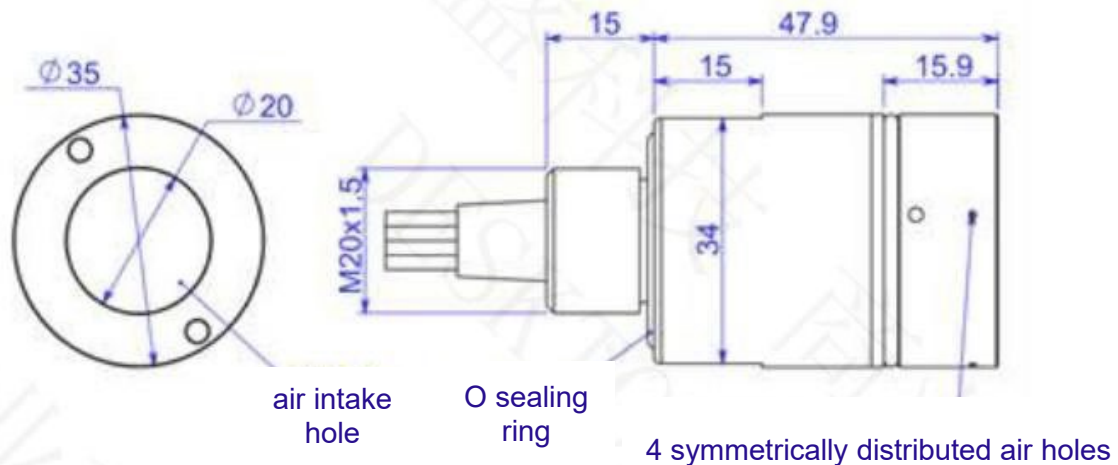
Target Gas	Methane (CH ₄)
Principle	Laser
Working voltage	3.3V~5.0V (typical value: 3.6V)
Working current	50mA~200mA (typical value: 50mA)
Starting current	250mA~320mA (typical value: 250mA)
Measuring range	0~100%LEL
response time	10~15S
Minimum resolution	0.01%VOL
Working temperature	-40°C~60°C
Working humidity	<98%RH (non-condensing)
Working pressure	80Kpa~116Kpa
Storage temperature	-40°C~85°C
Indication error	NPT(normal pressure and temperature): ±3%LEL All working conditions: ±7LEL
Life Span	>3 years
Communication interface	TTL
Signal output frequency	0.5Hz
Housing material	Stainless steel
Certification	Explosive-proof certification
Size	Diameter*Height: 35mm*64mm

Table1 Technical parameters

Working Environment

- Working voltage: 3.3V - 5.0 V DC
- Temperature range: -40°C~60°C
- Humidity range: 0-98%RH

Dimensions



Interface lead definition

Pin number	Pin definition	Pin color
1	VCC	Red
2	GND	Black
3	RXD	Yellow
4	TXD	Green

Table2 Sensor interface lead definition

Operating Instructions:

To ensure the normal operation of the sensor, the operating voltage of the sensor must be within the range of 3.3V-5.0VDC. If the voltage exceeds this range, a fault may occur, or the sensor may not work properly.

To ensure the normal operation of the sensor, the current output capacity of the power supply should be no less than 500mA. If the power supply circuit capacity is lower than this value, the fault may occur, or the sensor cannot work properly.

The preheating time of the sensor is 10 seconds after the sensor is powered on, and the gas concentration value read out during the preheating is not accurate, so it is necessary to wait for the end of the sensor preheating to obtain an accurate concentration value.

Sensor sampling digital signal output mode, actively upload the relevant data information.

Communication Protocol

1) communication setting

Baud rate	115200
Data bit	8 -bit
Stop bit	1 -bit
Check bit	none
Flow control bit	none

Table3 Sensor communication setting

2) Communication format

When the probe is in the detection state, the output form is ACSII string fixed-length output, a total of 29 bytes, the format is as follows: symbol xxx.xx space symbol nn.n space pppp.pp space SS space HH<CR><LF> xx represents the concentration, unit %VOL, range -999.99~+999.99; n indicates the temperature, unit ° C, ranging from -99.9 to +99.9.

pppp.pp represents gas pressure, unit mbar, range 0000.00~9999.99; SS indicates the device status code. HH is the XOR check value of the first 25 bytes. The check byte is output in the form of two characters. <CR><LF> represents the return line break.

3) Message frame

When the probe is in the detection state, the output form is active fixed-length string output, a total of 29 bytes, in the following format:

Function code	Density	Space	Temperature	Space	Pressure	Space	Fault code	Space	XOR verification code	Enter	Line feed	
Byte serial number	1~7	8	9~13	14	15-21	22	23~24	25	26~27	28	29	
Byte number	7	1	5	1	7	1	2	1	2	1	1	
Unit	%VOL	/	°C	/	Mbar	/	/	/	/	/	/	
eg.	ACSII	+000.00	<SP>	+21.4	<SP>	1001.01	<SP>	00	<SP>	28	<SP>	<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

Table 4 Data format definition

4) Calculation of check value

The calculation method is XOR from the first byte backward one by one. At the end of the first 25 bytes, a one-byte check result is obtained, and the result is converted to two-character output. For example, if the result is 0X28, the characters '2' and '8' are the output results. If the characters are letters, the output is all uppercase.

eg. Current density 0.00%VOL Temperature 21.4°C Pressure 1001.01 mbar Output:
+000.00 +21.4 1001.01 00 28<CR><LF>

5) Status code table

Status code	Condition	Implication
00	Normal operation condition	
01	Optical path fault	Absorption spectrum deviation
02		High light intensity
03		Low light intensity
20		Uncalibrated
10		The temperature and humidity sensor is abnormal.
30		The internal temperature of the laser is abnormal

Table 5 Status code table

Maintenance precautions

1. If the sensor is used for a long time in an environment with high dust density, the dust cover should be cleaned regularly.
2. The sensor should be equipped with waterproof breathable film for long-term use in humid environment.
3. Use the sensor within the sensor power supply range.