INSTRUCTION MANUAL

Explosion-proof hydrogen sulfide sensor

JXBS-4001-H$_2$S

VER1.0

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I BRIEF INTRODUCTION

1.1 Product Overview

Explosion-proof hydrogen sulfide sensors have been specially developed for certain harsh environments. Cast aluminum explosion-proof housing, the probe is placed in a special metal probe compartment, and the electrical part is isolated from the probe.

It adopts a professional test hydrogen sulfide concentration sensor probe as the core detection device; it has the characteristics of wide measurement range, high accuracy, good linearity, good versatility, easy use, easy installation, long transmission distance, and moderate price.

1.2 Primary Parameters

PARAMETERS	TECHNICAL SPECIFICATIONS
MEASURING RANGE	0-100ppm/0-1000ppm
MEASURING MODE	Electrochemical sensor
PRECISION	3%F.s
RESPONSE TIME	less than 15 seconds
WARRANTY PERIOD	2 years (Host) / 1 year (Sensor)
COMMUNICATION PORT	Analog (voltage / current) / digital (RS485)
POWER SUPPLY	12-24V DC

POWER CONSUMPTION	<1W
OPERATING TEMPERATURE	-40℃~ +50℃
WORKING HUMIDITY ENVIRONMENT	15-95% RH (relative humidity), no condensation
EXPLOSION-PROOF GRADE	Exd ⅡCT6
CASE SIZE	172×142×90mm³

1.3 Probe Parameters And Selection

NO.	MANUFACTURER	RANGE	RESOLUTION(ppm)	LIFE
4G	Import	100	0.1	>2 years
4L	Import	1000	0.1	>2 years

The service life of the above probes is in an air environment with a temperature of 23 ± 3 ℃ and a humidity of 40 ± 10% RH.

The default probe used is a 4G probe.

1.4 Analog communication parameters

Parameter	Index
Current output type	4-20mA
Current output load	≤600Ω
Voltage output type	0-5V/0-10V
Voltage output load	≤250Ω

1.5 Digital communication parameters

Parameter	Index
Communication Interface	RS485
Baud rate	2400/4800/9600
Protocol	Modbus RTU

Ⅱ HARDWARE CONNECTIONS

2.1 CHECKING BEFORE INSTALLATION

Check the list of devices before installation:

Name	Number
THE EXPLOSION-PROOF SENSOR DEVICE	1
12V POWER ADAPTER （Optional)	1
THE USB TO 485 DEVICE （Optional)	1
WARRANTY CARD / CERTIFICATE	1

2.2 Interface Description

Wide voltage power input can be 12-24V. When wiring the 485 signal line, pay attention that the two A / B lines cannot be reversed, and the addresses between multiple devices on the bus cannot conflict.

	Line Color	Description
Power	Brown	Power supply Positive (12-24V DC)
	Black	Power supply Negative
Communication	Yellow (Gray)	485-A
	Blue	485-B

The power interface is wide voltage power input 12-24V. For analog products, pay attention to the positive and negative signal lines. Do not reverse the positive / negative current / voltage signal lines.
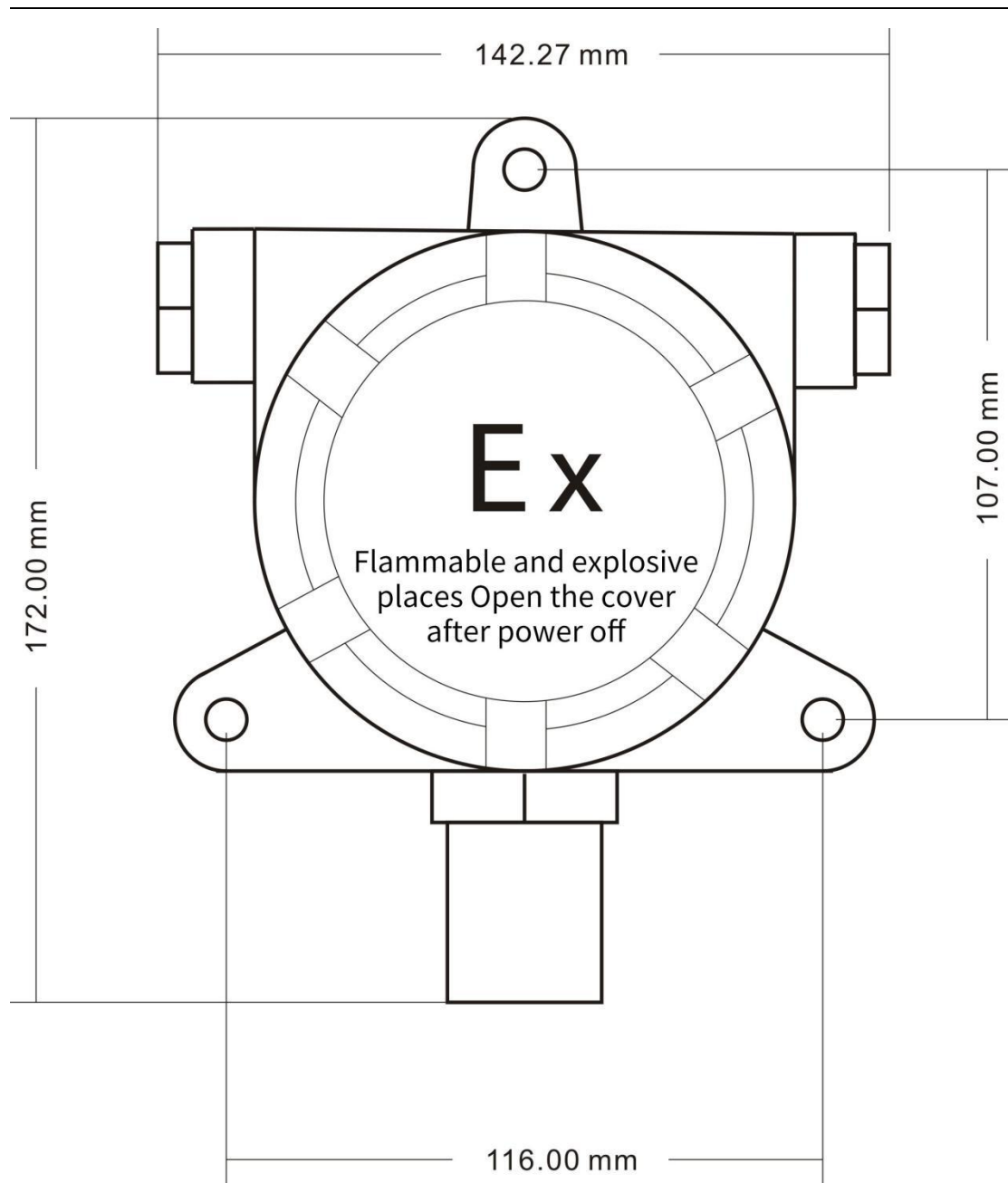
	Line Color	Description
Power	Brown	Power supply Positive (12-24V DC)
	Black	Power supply Negative
Communication	Yellow (Gray)	Positive voltage / current output
	Blue	Voltage / current output negative

We provide default cable length of 0.6 meters, you can extend the cable yourself according to your needs.
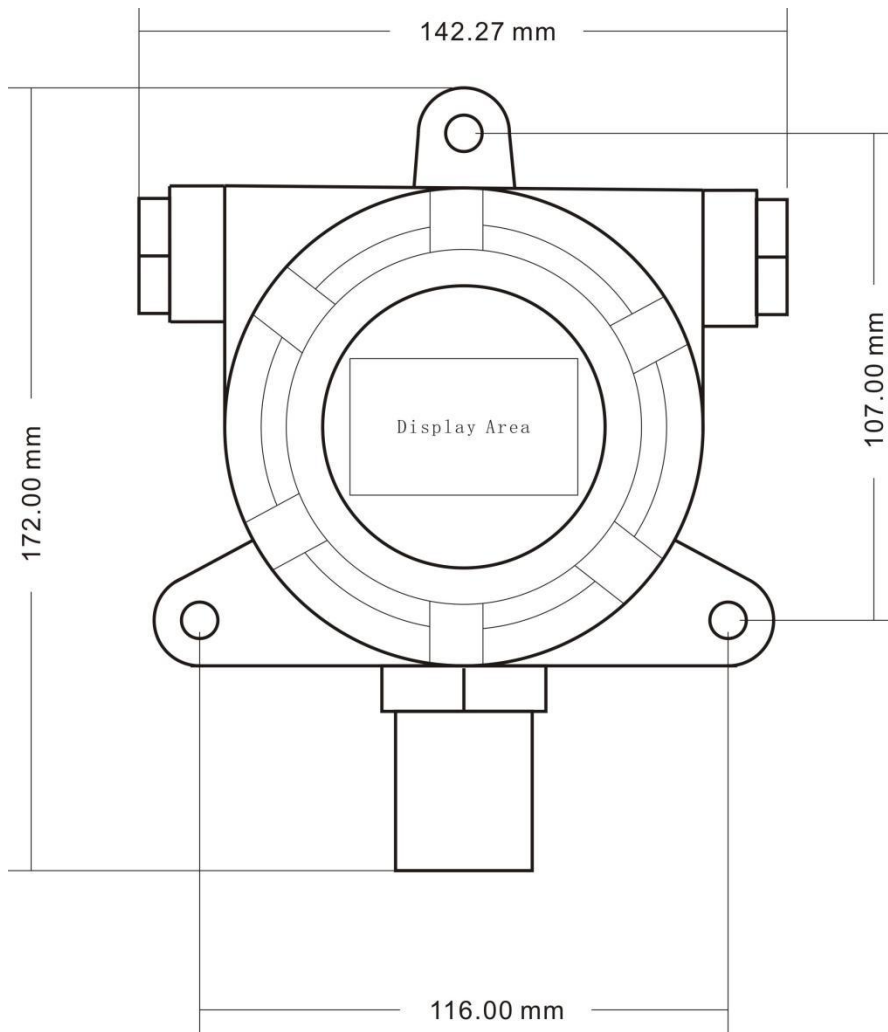
2.3 Installation Description

The explosion-proof sensor is wall-mounted and can be fixed by three 8mm fixing holes. Customers can use expansion screws or bolts. The size and position of the fixing hole are as follows:

Please ensure the installation direction during installation.

142.27 mm

107.00 mm

172.00 mm

116.00 mm

Ex

Flammable and explosive
places Open the cover
after power off

Without display sensor size and installation drawing

Sensor size and installation drawing with display window

Ⅲ DIGITAL SENSOR COMMUNICATION PROTOCOL

3.1 Communication Basic Parameters

PARAMETERS	CONTENT

Coding	8-bit binary
Data bits	8 bit
Parity bit	No
Stop bit	1 bit
Error checking	CRC (redundant loop code)
Baud rate	2400 bps/ 4800 bps/ 9600 bps can be set factory defaults to 9600 bps

3.2 Data frame format definition

Modbus-RTU communication protocol is adopted, the format is as follows:

Time for initial structure ≥ 4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC

Time to end structure ≥ 4 bytes

Address code: It is the address of the transmitter and is unique in the communication network (factory default 0x01).

Function code: The function instruction of the command issued by the host, this transmitter only uses the function code 0x03 (reading register data).

Data area: The data area is the specific communication data. Note that the high

byte of the 16bits data comes first!

CRC code: two-byte check code.

Inquiry frame

address code	function code	Register start address	Register length	Low check bit	Check code high
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Response frame

address code	function code	Number of valid bytes	Data area	Second data area	Nth data area
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes

3.3 Register Address

Register Address	Plc Configuration Address	Content	Operation
0000H	40001	Temperature (Unit 0.1℃)	Read-Only
0001H	40002	Humidity (Unit 0.1%RH)	Read-Only
0006H	40007	Hydrogen sulfide (unit 0.1ppm)	Read-Only
0100H	40101	Device Address (0-252)	R/W

| 0101H | 40102 | Baud Rate (2400/4800/9600) | R/W |

3.4 Communication protocol examples and explanations

3.4.1 Read Device Address 0x01's hydrogen sulfide Concentration

Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00 0x06	0x00 0x01	0x64	0x0B

Answer Frames(For example, the reading is 18.9ppm)

Address Code	Function Code	Returns to The Number Of Valid Bytes	Hydrogen sulfide Value	Check Digit Low	Check Digit High
0x01	0x03	0x02	0x00 0xBD	0x78	0x35

Hydrogen sulfide ：

　00BD H (hexadecimal) = 189 =>Hydrogen sulfide = 18.9ppm

3.4.2 Read Device Address 0x01's Temperature And Humidity Value

Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00,0x00	0x00,0x02	0xC4	0x0B

Answer Frame

Address Code	Function Code	Number Of Valid Bytes	Humidity Value	Temperature Value	CRC_ L	CRC_ H
0x01	0x03	0x04	0x00	0x00	0xDB	0xBF
			0xFE	0xAF		

Temperature：

　00AFH（hexadecimal）=175=> Temperature =17.5℃

Humidity：

　00FE H（hexadecimal）=254=> Humidity =25.4%RH

3.4.3 Read Device Address 0x01's Temperature And Humidity, Hydrogen sulfide Concentration Value

Inquiry Frame

Address Code	Function Code	Start Address	Data Length	CRC_L	CRC_H
0x01	0x03	0x00,0x00	0x00,0x07	0x04	0x08

Answer Frame

Address Code	Function Code	Number Of Valid Bytes	Humidity Value	Temperature Value
0x01	0x03	0x0E	0x03	0x01
			0x14	0x1B

8 Useless Bytes		Hydrogen sulfide	CRC_L	CRC_H

0x00 …	Value		
	0x00 0x28	0x50	0x3B

Temperature：

  011B H（hexadecimal）=283=> Temperature =28.3 ℃

Humidity：

  0314 H（hexadecimal）=788=> Humidity =78.8%RH

Hydrogen sulfide：

  0028 H (hexadecimal) = 40 => Hydrogen sulfide = 4ppm

3.5 H_2S measurement unit ppm and μg / m³ conversion

According to the calculation, the conversion relationship can be obtained, which is only valid for H_2S:

  1ppm = 34 / 22.4 = 1.518mg / m³ = 1518μg / m³

  1ppb = 34 / 22.4 = 1.518μg / m³

The above calculations are for the case of standard atmospheric pressure.

IV MEANING AND CONVERSION OF ANALOG SENSOR PARAMETERS

4.1 Analog 4-20mA Current Output

Current Value	H$_2$S
4mA	0ppm
20mA	100 ppm

The calculation formula is P $_{(H2S)}$ = (I $_{(current)}$ -4mA) * 6.25 ppm

The unit of P is ppm and the unit of I is mA.

For example, the data collected in the current situation is 8.125mA, and the test result is 25.7ppm.

The above is the calculation method for 100ppm range. For other ranges, please use 4mA for 0ppm and 20mA for the maximum range.

4.2 Analogue 0-10V Voltage Output

Voltage Value	H$_2$S
0V	0ppm
10V	100 ppm

The calculation formula is P $_{(H_2S)}$ = V $_{(voltage)}$ * 0.01

The unit of P is ppm and the unit of V is mV.

For example, the data collected in the current situation is 3510mV, and the test

result is 35.1ppm.

The above is the calculation method for 100ppm range. For other ranges, please use 0V for 0ppm and 10V for the maximum range.

4.3 Analogue 0-5V voltage output

Voltage Value	H_2S
0V	0ppm
5V	100ppm

The calculation formula is $P_{(H2S)} = V_{(voltage)} * 0.02$

The unit of P is ppm and the unit of V is mV.

For example, the data collected in the current situation is 4220mV, and the test result is 84.5ppm.

The above is the calculation method for 100ppm range. For other ranges, please use 0V for 0ppm and 5V for the maximum range.

V FREQUENTLY ASKED QUESTIONS AND QUALITY ASSURANCE

5.1 Digital devices cannot be connected to a PLC or

computer

The possible reasons are as follows:

● The computer has multiple COM ports, and the selected port is incorrect.

● The device address is wrong, or there are devices with duplicate addresses (the factory defaults are all 1).

● Baud rate, check mode, data bit, stop bit error.

● The host polling interval and waiting for response time are too short, both need to be set above 200ms.

● The 485 bus is disconnected, or the A and B wires are reversed.

● Too many devices or wiring is too long, you should supply power nearby, add 485 booster, and increase 120Ω terminal resistance.

● The USB to 485 driver is not installed or damaged.

● Equipment is damaged.

5.2 Possible Causes of No Analog Output or Output Error

● The measurement error caused by the wrong range corresponds to the PLC calculation. Please refer to the technical specifications in Part I for the range.

● The wiring method is incorrect or the wiring sequence is wrong.

● The distance between the transmitter and the collector is too long, causing signal disturbance.

● The PLC acquisition port is damaged.

● Equipment is damaged.

5.3 Warranty and after sales

The warranty terms are in accordance with the sensor after-sales clauses of Weihai Jingxun Changtong Electronic Technology Co., Ltd. The warranty period is two years for the main circuit of the sensor, one year for the gas-sensitive probe, and three months for the accessories (shell, plug, cable, etc.)