



1. Product Introduction

1.1 Product Overview

This product is a device for measuring the concentration of dissolved oxygen in a solution. It adopts the measurement principle of fluorescence method, does not consume oxygen, and does not need electrolyte. Built-in temperature transmitter with automatic temperature compensation function. The calibration function provides a simpler and more convenient calibration method. It can be widely used in water treatment, aquaculture, environmental monitoring and other industries.

1.2 Features

- The measuring range of dissolved oxygen is 0~20mg/L (0~200% saturation).
- RS485 communication interface: MODBUS RTU communication protocol can be easily connected to the computer for monitoring and communication.
- ModBus communication address can be set, baud rate can be modified.
- The equipment adopts wide voltage power supply, DC 10~30V can be used.
- Using the principle of fluorescence measurement, no oxygen consumption, no electrolyte.

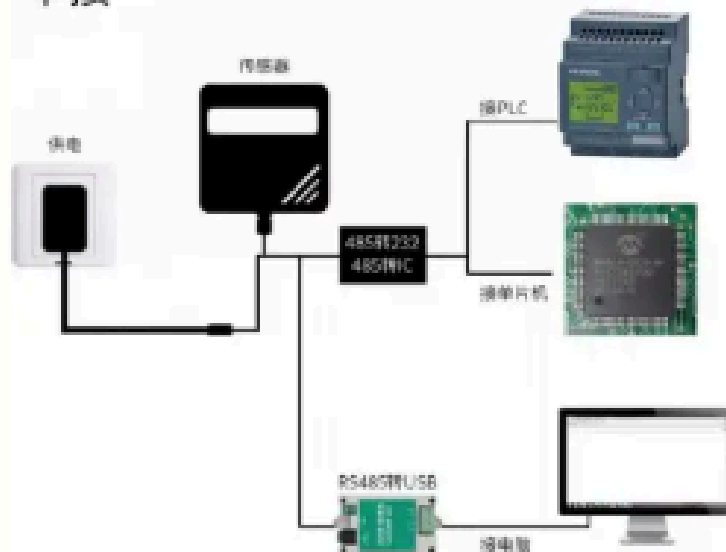
1.3 Main parameters

model	VMS-3002-LDO/LD-OS-N01-20
powered by	DC 10~30V
power consumption	0.2W
Communication Interface	RS485; standard MODBUS-RTU protocol; communication baud rate: default 4800 (1200bit/s, 2400bit/s, 4800bit/s, 9600bit/s, 19200bit/s, 38400bit/s, 57600bit/s, 115200bit/s can be set)
Measuring principle	Fluorescence
Measuring range	0~20mg/L (0~200% saturation)
Measurement error	±3%FS; ±0.5℃ (25℃)

resolution	0.01mg/L; 0.1%; 0.1℃
Response time	≤60sec
Equipment working conditions	0~40℃
Fluorescent film life	Normal use for 1 year
Storage conditions	-10~60℃
waterproof level	IP68
Electrode wire length	Default 5m
shell material	Corrosion-resistant plastic, stainless steel
powered by	DC 10~30V
power consumption	0.2W

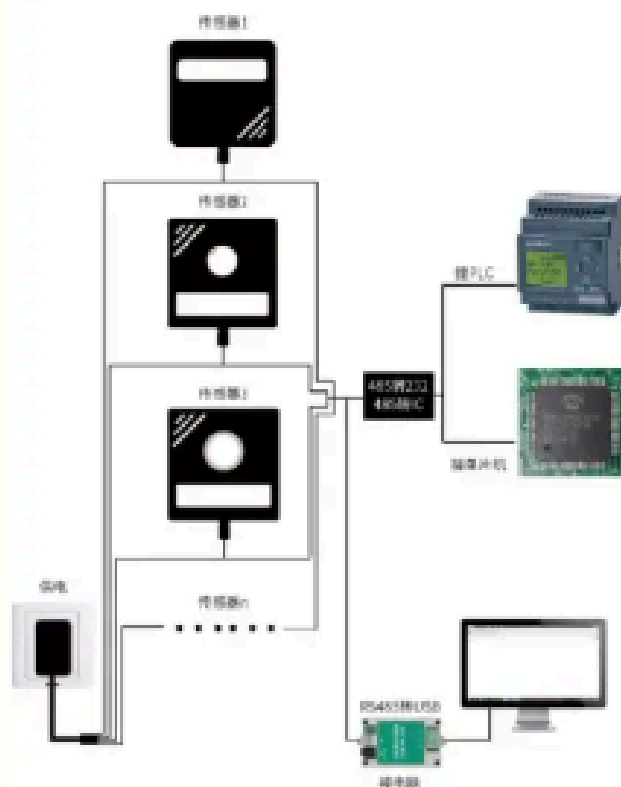
1.4 System frame diagram

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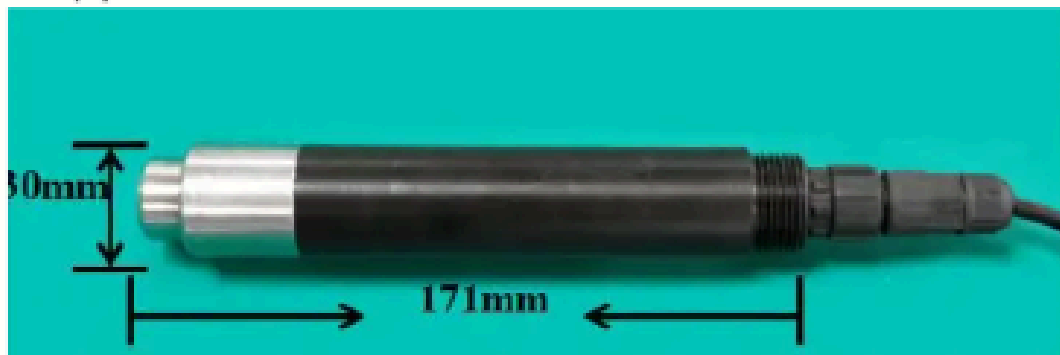


This product can also be used with multiple sensors combined in one 485 bus. In theory, one bus can have 254 485 sensors, and the other end can be connected to a PLC with a 485 interface, connected to a single-chip microcomputer through a 485 interface chip, or can be connected with a USB to 485. Computer connection, use the sensor configuration tool provided by our company to configure and test (only one device can be connected when using the configuration software).

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1.5 Equipment size

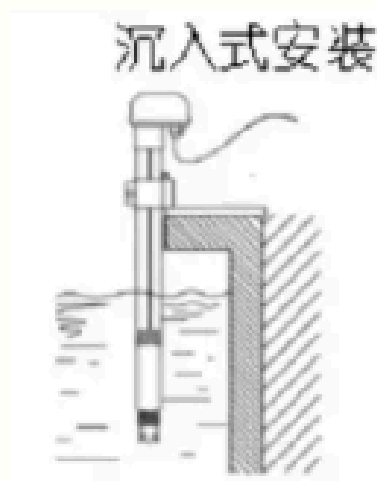


1.6 Equipment installation

The sensor should be submerged below the liquid surface for fixed installation. Avoid bumping or scratching the surface of the fluorescent film head during installation and use. The fluorescent film head part should be prevented from being attached to the bottom sediment. The rubber boot should be removed when in use.

Submerged installation:

With NPT3/4 thread, it can be used with our waterproof pipe. The cables are threaded out of the tube and the device is screwed into the watertight pipe threads.



2.Instructions for use

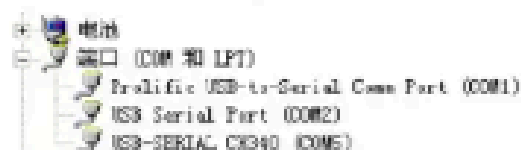
2.1 Wiring instructions

	thread color	illustrate
power supply	brown	Positive power supply (7~30V DC)
	black	power negative
communication	yellow	485-A
	blue	485-B

2.2 Parameter Configuration Instructions

Open the data package, select "debugging software" --- "485 parameter configuration software", find and open it.

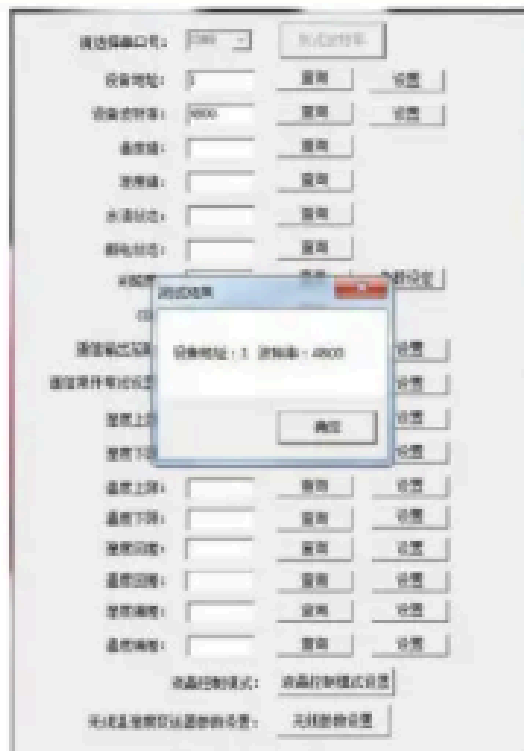
1) Select the correct COM port ("My Computer-Properties-Device Manager-Port" to view the COM port), the following figure lists several different driver names of the 485 converter.



2) Connect only one device and power on, click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.

3) Modify the address and baud rate according to the needs of use, and at the same time query the current function status of the device.

4) If the test is unsuccessful, please recheck the device wiring and 485 driver installation.



2.3 ModBus communication and register details

2.3.1 Basic parameters of device communication

Coding	8-bit binary
data bit	8 bits
parity bit	none
stop bit	1 bit
error checkin g	CRC (Redundant Cyclic Code)
baud rate	1200bit/s, 2400bit/s, 4800bit/s, 9600bit/s, 19200bit/s, 38400bit/s, 57600bit/s, 115200bit/s can be set, the factory default is 4800bit/s

2.3.2 Data frame format definition

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

Time for initial structure ≥ 4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error checking = 16-bit CRC code

Time to end structure ≥ 4 bytes

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

Function code: the command function instruction sent by the host.

Data area: The data area is the specific communication data, pay attention to the high byte of 16bits data first! CRC code: two-byte check code.

2.3.3 Register address

2.3.4 Example and explanation of communication protocol

register address	Support function code	illustrate
0x0000、0x0001	0x03	Dissolved oxygen saturation (%; floating-point number big endian)
0x0002、0x0003	0x03	Dissolved oxygen concentration (mg/L; floating point number big end)
0x0004、0x0005	0x03	Temperature (°C; floating-point number big endian)
0x1010	06	Calibration (write 0x0001 to calibrate the zero point, Write 0x0002 to calibrate the 100% saturation point)
0x1020	0x03/0x06	Salinity (‰; default 0)
0x1022	0x03/0x06	Atmospheric pressure (kPa; default 101.33, the actual value is expanded by 100 times)
0x07D0	0x03/0x06	Device address (1~254, factory default 1)
0x07D1	0x03/0x06	Device baud rate: 0 represents 2400 1 represents 4800 2 represents 9600 3 represents 19200 4 represents 38400 5 represents 57600 6 represents 115200 7 represents 1200

Example 1: Read the current dissolved oxygen saturation (%), dissolved oxygen concentration (mg/L) and temperature of the device whose address is 01

Send frame:

address code	function code	register address	Register content	Check code low	check code high
0x01	0x03	0x00 0x00	0x00 0x06	0xc5	0xc8

Response frame:

address code	function code	effective bytes	Register content	Check code low	check code high
0x01	0x03	0x0c	0x3f 0x6a 0xeb 0x52 0x40 0xe2 0x48 0xb0 0x41 0xe5 0x85 0xc5	0xa7	0x49

The big end of the floating point number 3f 6a eb 52 is 0.917653, indicating that the dissolved oxygen saturation is 91.8%

The big end of the floating point number 40 e2 48 b0 is 7.071373 and the dissolved oxygen concentration is 7.07mg/L

The big end of the floating-point number 41 e5 85 c5 is 28.690317, indicating that the temperature is 28.7° C

Example 2: Write atmospheric pressure

Send frame: write atmospheric pressure 101.35kPa to the device with address code 1

Write 10135 to the 0x1022 register and convert it to 2797 in hexadecimal

address code	function code	register address	Register content	Check code low	check code high
0x01	0x06	0x10 0x22	0x27 0x97	0x77	0x5e

Response frame: (According to the MODBUS standard, the response is the mirror message of the sent frame)

address code	function code	register address	Register content	Check code low	check code high
0x01	0x06	0x10 0x22	0x27 0x97	0x77	0x5e

Example 3: Zero point calibration

After the sensor stabilizes in anaerobic water, write 0x0001 to the 1010H register

address code	function code	register address	Register content	Check code low	check code high
0x01	0x06	0x10 0x10	0x00 0x01	0x4d	0x0f

Response frame: (According to the MODBUS standard, the response is the mirror message of the sent frame)

address code	function code	register address	Register content	Check code low	check code high
0x01	0x06	0x10 0x10	0x00 0x01	0x4d	0x0f

3. Precautions and maintenance

- ◆ When there is an obvious fault in the equipment, please do not open it to repair it yourself, and contact us as soon as possible!
- ◆ The fluorescent film at the front of the device should avoid collision or scratching, any damage will lead to a decrease in measurement accuracy or even make it unusable.
- ◆ Avoid using in organic solvents, avoid using organic solvents to clean fluorescent caps.
- ◆ When installing the equipment, try to avoid the cables being too tight or stressed.
- ◆ Equipment cleaning:

For the outer surface of the equipment; it can be cleaned with tap water and wiped with a damp soft cloth. For some stubborn dirt, it can be cleaned by adding some household detergent to the tap water;

For the outer surface of the fluorescent cap, rinse the dirt on the sensor light window with clean water; if necessary, wipe it gently with a soft cloth, and do not scratch it hard to prevent damage to the fluorescent film, resulting in inaccurate measurement and measurement failure.

If there is dust or water vapor in the fluorescent cap: unscrew the fluorescent cap, rinse the inner surface of the fluorescent cap and the optical glass window of the device with tap water, if there is oily dirt, wash it with tap water mixed with household detergent, and then wash it. Rinse off with detergent, dry all cleaned surfaces with a soft, lint-free cloth, and place in a dry place to allow the water to evaporate completely.

- ◆ The equipment should be calibrated before each use. It is recommended to calibrate once every 3 months for long-term use. The calibration frequency should be adjusted according to different application conditions (the degree of dirt in the application, the deposition of chemical substances, etc.).