Dissolved oxygen sensor Introduce

Fluorescence method

Type NO.: RD-DO-F-03

1. Product Introduce

Fluorescence dissolved oxygen sensor, no oxygen consumption, no flow rate limitation, no electrolyte, no maintenance and calibration, strong anti-interference ability, and excellent stability. Built-in temperature sensor, automatic temperature compensation. RS485 output, can be networked without a controller.

2. Product Features

1. Digital sensor, RS485 output, support MODBUS
2. No membrane, no electrolyte, no interference, no frequent calibration
3. No oxygen consumption, no flow rate limitation
4. With super high cost performance

3. Product Principle

Fluorescence dissolved oxygen sensor is based on the quenching principle of active fluorescence by specific substances in physics. The blue light emitted from a light-emitting diode (LED) irradiates the fluorescent material on the inner surface of the fluorescent cap. The fluorescent material on the inner surface is excited and emits red light. The phase difference between the red light and the blue light is detected and compared with the internal calibration value. Comparing to calculate the concentration of oxygen molecules, the final value is automatically compensated by temperature and air pressure.

4. Product application

It can be widely used in the continuous monitoring of dissolved oxygen values in chemical fertilizer, river, metallurgy, environmental protection water treatment engineering, pharmaceutical, biochemical, food, aquaculture and tap water.

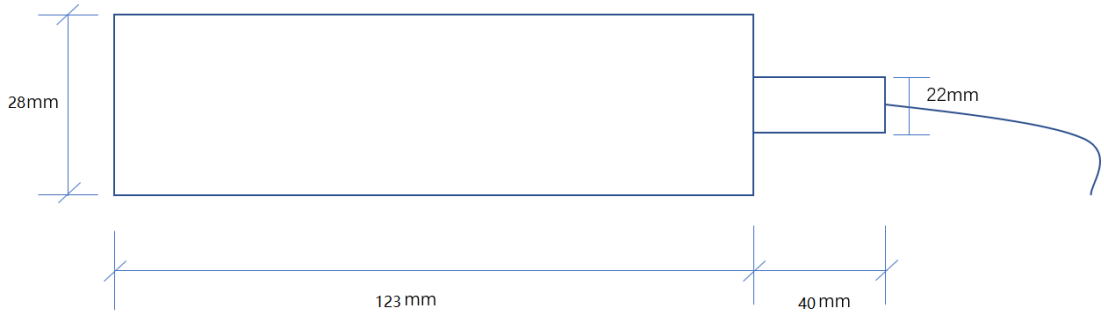
5. Product Parameter

1. Technical Parameters

- Measuring range: 0~20mg/L or 0~200% saturation,0-50℃
- Resolution: 0.01 mg/L, 0.1 °C
- Measurement accuracy: ±0.3%FS, ±0.3°C

- Automatic temperature compensation: 0 ~ 50 ° C
- Output signal: RS485 (standard Modbus-RTU protocol, device default address: 01)
- Supply voltage: DC 12~24V, current <50mA
- Working environment: temperature 0 ~ 50 ° C;
- Power consumption: ≤0.5W
- Waterproof: IP68
- Operating pressure: 6bar
- Probe cable length:10 meters
- Fluorescent cap life: Guaranteed use for one year (under normal use)
- Shell material: Stainless steel

6. Product size



7. Wire connection diagram

1. Red wire-power supply (VCC)
2. Black wire --- ground wire (GND)
3. White or Yellow line---485 Data_A (485_A)
4. Green wire—485 Data_B (485_B)

8. Air dissolved oxygen ratio table

Temperature℃	DO mg/L	Temperature℃	DO mg/L	Temperature℃	DO mg/L
0	14.60	16	9.86	32	7.30
1	14.22	17	9.64	33	7.17
2	13.80	18	9.47	34	7.06
3	13.44	19	9.27	35	6.94
4	13.08	20	9.09	36	6.84
5	12.76	21	8.91	37	6.72
6	12.44	22	8.74	38	6.60
7	12.11	23	8.57	39	6.52
8	11.83	24	8.41	40	6.40
9	11.56	25	8.25	41	6.33
10	11.29	26	8.11	42	6.23
11	11.04	27	7.96	43	6.13
12	10.76	28	7.83	44	6.06
13	10.54	29	7.68	45	5.97
14	10.31	30	7.56	46	5.88
15	10.06	31	7.43	47	5.79

Note: The oxygen content of the air above is the value under standard atmospheric pressure, and it should be determined according to the local air pressure.

9. Installation method

1. Please pay attention that Never touch the fluorescent cap on the sensor head with nails or sharp objects.
2. Remove the rubber cover before use and put on the plastic protective cover.
3. Remove the plastic protective cover after use, and put on the rubber cover again.
4. Please use clean water to rinse the fluorescent film or the matching brush.
5. It can be put into the water directly or install it by the mounting bracket

Introduction of river mounting bracket

10. Data conversion method

1. Basic Modbus setting

Standard Modbus-RTU protocol, baud rate: 9600; check digit: none; data bit: 8;

stop bit: 1

2. Get sensor ID

Get the current sensor MODBUS address. This command uses 0XFF as the fixed address field, and reads the current electrode's MODBUS device address from the MODBUS register whose starting address is 0X0010.

Take the return address 03 as an example to illustrate the command to get the sensor ID address, Host → slave

Address domain	Function code	Start address		Number of registers		CRC	
0xFF	0x03	0x00	0x10	0x00	0x01	0x90	0x11

If the transmitter receives correctly, return the following data, slave → host

Address domain	Function code	Number of bytes.	Register value.		CRC	
0xFF	0x03	0x02	0x03	0x00(Reserved.)	0x91	0x60

3. Modify the address

For example: change the address of the transmitter with address 01 to 14, host → slave

Device address	Function code	Start address		Number of registers		Number of bytes	New address	Reserved value	CRC	
0x01	0x10	0x00	0x10	0x00	0x01	0x02	0x14	0x00	0xAB	0XC0

If the transmitter receives correctly, return the following data, slave → host

Device address	Function code	Start address		Number of registers		CRC	
0x01	0x10	0x00	0x10	0x00	0x01	0x00	0x0C

4. Query DO and temperature data

Query the data of the transmitter (address 1) (Dissolved oxygen, temperature), host → slave

Address	Function code	Start register address high	Start register address low	Register length high	Register length low	CRC16 low	CRC16 high
0X01	0X03	0X00	0X00	0X00	0X04	0X44	0X09

If the transmitter receives correctly, return the following data, slave → host

Address	01	
Function code	03	

Data length	08	
Register value	0X48	DO value
	0XE1	
	0X0A	
	0X41	
Register value	0XF6	Temperature value
	0X28	
	0XB4	
	0X41	
CRC	0X59	
	0X5A	

Data representation method:

Numerical conversion is a floating point number, in accordance with IEEE 754 (single precision), the HEX value is " A B C D" and the order of data parsing is "D C B A".

A: DO value in the (mg/L): HEX: 48 E1 0A 41, and the data parsing order is 41 0A E1 48, Change the HEX into Decimal according to the IEEE 754 (single precision), that is 8.68mg/L.

B: Temperature value : HEX: F6 28 B4 41, and the data parsing order is : 41 B4 28 F6 , Change the HEX into Decimal according to the IEEE 754 (single precision), that is 22.52℃

5. Query present calibration value

Take address 01 as an example to read the present calibration value, Host → slave

Sensor address	Function code	Start address		Number of registers		CRC	
0x01	0x03	0x00	0x11	0x00	0x02	0x94	0x0E

If the transmitter receives correctly, return the following data, slave → host

Address domain	Function code	Number of bytes.	Register value.				CRC	
0x01	0x03	0x04	0x06	0x82	0X00	0X3E	0xDB	0x43

A: Atmospheric pressure value (MPa) in the: HEX:06 82 00 3E, and the data parsing order is 3E008206, Change the HEX into Decimal according to the IEEE 754 (single precision), that is 0.125496.

(The calibration value is determined by comprehensive factors and is for reference only).

6. Set atmospheric pressure

Set the probe atmospheric pressure

Calculate the dissolved saturated oxygen corresponding to the air, and send this command after the product is still in a saturated dissolved oxygen environment and the reading is stable. (Under the condition of low requirements, take the product out of the water and leave it in the air for half an hour. After the reading is stable, Send instructions.)

The following takes the probe device address 01 and atmospheric pressure 101.33Kpa as an example to illustrate the request frame and response frame for setting the dissolved oxygen correction curve command, where 10133 (DEC) = 2795 (HEX)

Address	01	
Function code	10	
Start address	0X00	
	0X11	
Number of registers	0X00	
	0X01	
Number of bytes	0X02	
Register value	0X95	The HEX is 2795, but need the order in 9527
	0X27	
CRC	0X8A	
	0X5B	

If the transmitter receives correctly, return the following data, slave → host

Sensor address	Function code	Start address		Number of registers		CRC	
0x01	0x10	0x00	0x11	0x00	0x01	0x51	0XCC

*Note: Please input the same instruction at least two times to keep it is input correctly.

7. Revocation of on-site calibration

Cancel the on-site calibration curve and restore the factory calibration curve

The following takes the probe device address 01 as an example to illustrate the request and response to cancel the on-site calibration command

Host → slave

Address	01	
Function code	10	
Start address	0X00	
	0X21	

Number of registers	0X00	
	0X01	
Number of bytes	0X02	
Register value	0X14	
	0X00	
CRC	0XAF	
	0XE1	

If the transmitter receives correctly, return the following data, slave → host

Sensor address	Function code	Start address		Number of registers		CRC	
0x01	0x10	0x00	0x21	0x00	0x01	0x51	0XC3

8. Query salinity calibration value

Take address 01 as an example to read the salinity calibration value, Host → slave

Sensor address	Function code	Start address		Number of registers		CRC	
0x01	0x03	0x00	0x62	0x00	0x01	0x25	0XD4

If the transmitter receives correctly, return the following data, slave → host

Address domain	Function code	Number of bytes.	Register value.		CRC	
0x01	0x03	0x02	0x0A	0x00	0xBE	0XE4

A: 0X0A00 means the salinity value is 10ppt.

9.Set salinity value

Set the salinity as 10 PPT in the sensors address in 01

Address	01	
Function code	10	
Start address	0X00	
	0X62	
Number of registers	0X00	
	0X01	
Number of bytes	0X02	
Register value	0X0A	
	0X00	
CRC	0XA8	
	0XB2	

If the transmitter receives correctly, return the following data, slave → host

Sensor address	Function code	Start address		Number of registers		CRC	
0x01	0x10	0x00	0x62	0x00	0x01	0XA0	0X17

Note: Since the dissolved oxygen in the water is affected by the atmospheric pressure, temperature and salinity, please set the response value according to the specific use environment to obtain the correct dissolved oxygen value.