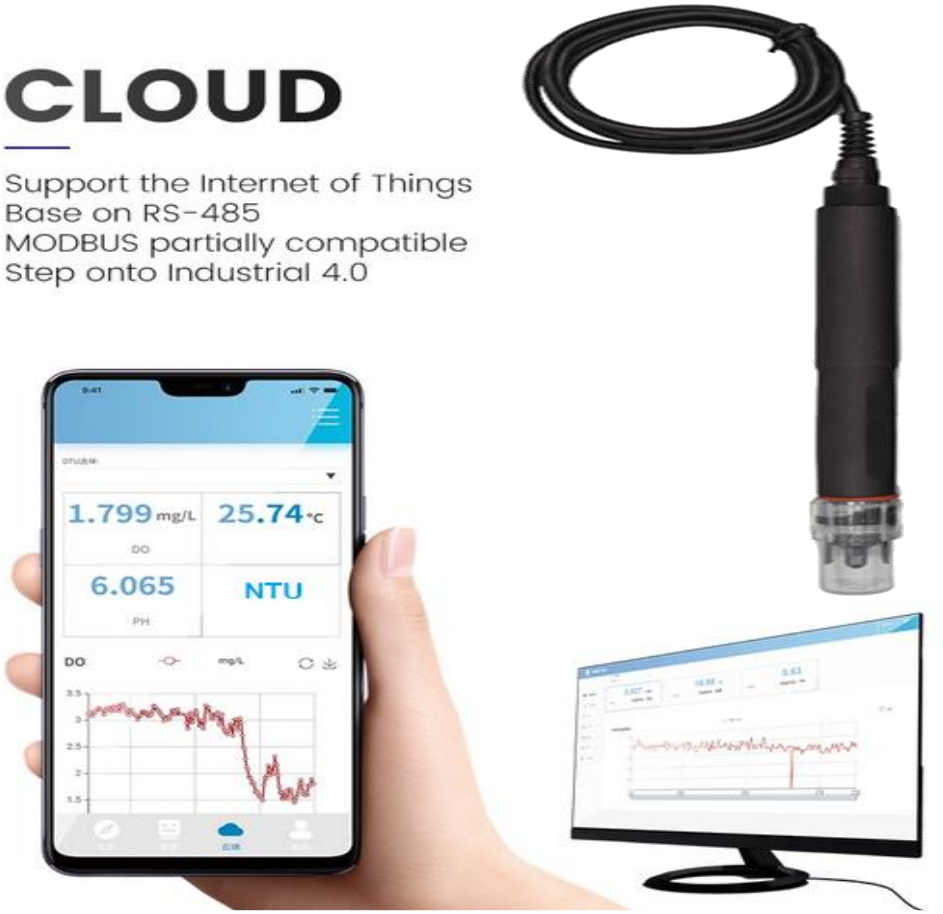
Digital ORP Sensor



Product configuration

Digital ORP sensor is a new generation of intelligent water quality monitoring digital sensor developed by our company. The data can be viewed, debugged and maintained through mobile APP or computer. It is characterized by simple maintenance, high stability, excellent repeatability and multi-function, and can accurately measure ORP value and temperature value in solution. It is widely used in the system of waste water treatment, purified water, circulating water and boiler water, as well as the ORP test in the fields of electronics, aquaculture, food, printing and dyeing, electroplating, pharmacy, fermentation, chemical industry, etc, and it has a strong function in the environmental monitoring of surface water and pollution discharge and the remote system application.

Main features

- ✧ This product is digital ORP sensor, which can directly output RS485 signal.
- ✧ The product has high accuracy, high stability and strong anti-interference ability.
- ✧ Automatic temperature compensation function.
- ✧ Without instrumentation, it can directly connect computer, PLC and other equipment with RS485/4-20ma signal interface for data acquisition and maintenance. It is convenient for users to integrate sensors into the industrial control environment such as

Upper computer system and physical union.

- ✧ Use mobile APP to collect, debug and maintain the sensor data through wired (OTG line and 485 to USB module) or wireless network (such as WIFI and GPRS).
- ✧ The sensor can be set through RS485 function, from machine address and baud rate, online calibration, restoration of factory output, the corresponding range of 4-20mA output (4-20mA is optional), scale coefficient and incremental compensation.
- ✧ Two point corrections is used.

Technical indicators

- ✧ Measuring Range: -1999~+1999mV, 1-100.0℃
- ✧ Accuracy: ±1 mV, ±0.3℃
- ✧ Stability: ≤2mV 24h
- ✧ Temperature compensation: 0～60℃
- ✧ 485 Interface: support for Internet of things (partial compatibility of MODBUS protocol)
- ✧ Working conditions: temperature of 0 ~ 60 ℃
- ✧ Input impedance: ≥1×1012Ω
- ✧ Output load: 4-20mA load<750Ω (optional)
- ✧ Working voltage:DC 5V or DC 12V
- ✧ Protection grade: IP68

Wiring Details

Power input
Positive

RS 485-B

RS 485-A

Power input
Negative

Digital ORP sensor communication protocol

MODBUS-RTU	
Baud rate	9600（default）
Device No	1（default）
Data bit	8 digits
odd-even calibration	NO
Stop bit	1 digits

Register setting

Register name	Address	Data type	Length (word)	Read/ write	Explain
Indicating value	R0	signed	1	R	
Temperature	R1	unsigned	1	R	(2 decimal places)
4ma output indicating value	R2	signed	1	R	
20ma Output indicating value	R3	signed	1	R	

Low range	R4	signed	1	R	2000 by default
High range	R5	signed	1	R	2000 by default
Proportionality coefficient	R6	unsigned	1	R	（1 位小数）
Increment	R7	signed	1	R	
Resolution ratio	R8	signed	1	R	0 by default
Product identification	R9	signed	1	R	17 by default
From the machine address	R10	unsigned	1	R	The range is 1-127
Baud rate	R11	unsigned	1	R	1200 2400 4800 9600 19200 38400 57600
Function calls	R12	unsigned	1	W	See parameter setting for details
Parameter 1	R13	unsigned	1	W	See parameter setting for details
Parameter 2	R14	unsigned	1	W	See parameter setting for details

4. MODBUS instruction format:

This sensor is compatible with MODBUS protocol 0x03, 0x06, 0x10 function code

Command format of 0x03

Definition	Address	Function code	Initial address	Number of registers	CRC verify
Data	ADDR	0x03	Rstart	Rnum	CRC 16
Number of bytes	1	1	2	2	2

Return format of 0x03

Definition	Address	Function code	Number of data	Data	CRC verify
Data	ADDR	0x03	Rnum* 2	Data	CRC 16
Numb-er of bytes	1	1	1	Rnum *2	2

Command format of 0x06

Definition	Address	Function code	Initial address	Data	CRC verify
Data	ADDR	0x06	Raddr	Data	CRC 16
Number of bytes	1	1	2	2	2

Return format (as in the command) of 0x06

Definition	Address	Function code	Register address	Data	CRC verify
Data	ADDR	0x06	Raddr	Data	CRC 16
Number of bytes	1	1	2	2	2

Command format of 0x01

Definition	Address	Function code	Initial address	Number of register	Number of data	Data	CRC verify
Data	ADDR	0x10	0x000C	0x0003	0x06	Data	CRC 16
Number of bytes	1	1	2	2	1	6	2

Return format of 0x01

Definition	Address	Function code	Initial address	Number of register	CRC verify
Data	ADDR	0x10	0x000C	0x0003	CRC 16
Number of bytes	1	1	2	2	2

5. Data reading

The sensor data is using MODBUS protocol 0x03 function code
Example: ORP value and temperature value are read
Send command: 01 03 00 00 00 02 C4 0B
Return: 01 03 04 00 DC 09 C4 3C 0A
The data section is: 00 DC 09 C4
PH value: data 0x00DC, convert to decimal is 220,ORP is 220Mv
Temperature value: 0x09C4 convert to decimal is 2500, temperature value is 25.00, and 2 decimal places are reserved.

6. Parameter adjustment:

1. The sensor parameter adjustment use the MODBUS protocol 0x06 or 0x10 function code.
2. Use 0x06 function code to adjust parameters into 3 steps
   1) write parameter 1 to register R13
   2) write parameter 2 to register R14
   3) write the function number to register R12
3. Using 0x10 function code, write function number, parameter 1 and parameter 2 to the three registers starting from R12 at one time.Equivalent to the step write effect.
4. When the function call is successful, all registers R12, R13 and R14 are reset to 0. If the function call fails or the parameters are not correct, register R14 will display -1

Function Call Parameter -List

Function call parameter list

Function	Parameter 1	Parameter 2	Function Code
Zero calibration	zero ORP value	1	1
Slope calibration	Slope ORP value	2	1
Manual temperature compensation	Temperature value * 100	Any numerical	2
Change the 4-20ma output range (customized)	The 4mA output represents the value	The 20mA output represents the value	3
Modified coefficient	ratio	Incremental value for indicating	5
Change the from the machine configuration	From the new number	New baud rate	6
Factory data reset	Password is 20034	Any numerical	7

Example: ORP value calibration (using 0x10 function code) Zero calibration: ORP value of standard liquid is 0mV, converted to hexadecimal is 0x0000.So, the function number is 0x0001, the parameter 1 is 0x0000, and the parameter 2 is 0x0001

The data part is: 00 01 00 00 00 01

Send command: 01 10 00 0C 00 03 06 00 01 00 00 00 01 DABF

Return: 01 10 00 0C 00 03 40 0B
Slope calibration: the ORP value of standard solution is 220, converted to hexadecimal 0x00DC.So, the function number is 0x0001, the parameter 1 is 0x00DC, and the parameter 2 is 0x0002
The data section is: 00 01 00 DC 00 02
Send command: 01 10 00 0C 00 03 06 00 01 00 DC 00 02 5B 44
Return: 01 10 00 0C 00 03 40 0B

7. Matters needing attention and maintenance

1. The electrode has been calibrated by the system before delivery and can be used directly.If there is any doubt about the measured value, the ORP standard buffer solution can be compared and the deviation can be re-calibrated.To improve the measurement accuracy, the ORP value of the buffer should be reliable, and the closer it is to the measured value, the better, generally no more than 20mV.

2. Please keep the electrode socket clean and dry, and make sure the positive and negative electrode and voltage value correspond to the label before power supply.

3. Clean the electrode with deionized water before and after measurement.To ensure the measurement accuracy, after the determination in the viscous sample, the electrode shall be rinsed repeatedly with hot deionized water to remove the sample stuck on

the platinum plate, or cleaned with appropriate solvent first, and then with deionized water to remove the solvent.

4. After long-term use, the electrode will be passivated, as the sensitivity gradient decreases, the response becomes slow and the reading is inaccurate. At this point, the lower platinum sheet of the electrode can be soaked for 24 hours with 0.1mol/L diluted hydrochloric acid (0.1mol/L diluted hydrochloric acid: 9mL hydrochloric acid was diluted with distilled water to 1000mL), and then soaked for several hours with 3mol/L KCL solution to restore its performance.

5. The electrode should be used for about one year, and new electrodes should be replaced after aging.

6. The electrode will be passivated if the electrode is polluted or the liquid interface is blocked. At this time, the electrode should be cleaned with appropriate solution according to the nature of the pollutant. (for information)

Contamination:	Cleaner:
Inorganic metal oxides	Less than 1 molar of hydrochloric acid
Organic oils	Dilute detergent (weak alkaline)
Resin polymer	Dilute alcohol, acetone, ether
Protein blood cell deposits	Acidic enzyme solution (such as pepsin)
pigments	Dilute bleach solution, hydrogen peroxide