**InStore**

# Digital ozone sensor

**CLOUD**

Support the Internet of Things
Base on RS-485
MODBUS partially compatible
Step onto Industrial 4.0

# Product Introduction

Digital ozone sensor is a new generation of intelligent water quality monitoring sensor which is researched and developed by our Company. Using advanced non-membrane constant voltage sensor, it's no need to change membrane and medicament. Stable performance, easy maintenance, support to check the data, debugging and maintenance by mobile phone or computer. With many features, such as, high sensitive, quick responds, exact measurement, high stability, excellent repeatability, easy maintenance and multi -functions and so on. It can measure the ozone of liquid exactly. It is widely used to online monitor and control the ozone content in liquid. Such as, circulating water, swimming pool, drinking water plant, hospital waste water, water quality treatment project .

# Main Feature

✧ This product is an ozone digital sensor, output RS485 signal directly.

✧ High accuracy, high stability, strong anti-jamming.

✧ It can connect to computer, PLC and other equipment which has Rs485/4-20mA signal interface to collect data and maintenance without instrument. It is convenient for users to integrate sensors into industrial control environment, such as, upper computer system and the internet of things.

✧ By using the mobile phone app, the sensor can be collected, debugged and maintained by the wireless network (such as WIFI / GPRS) or wired

network ( OTG line and 485 / USB module).

✧ The sensor can be set up by RS485 communication, slave address, baud rate,online calibration, recoverable factory setting, 4-20ma output range(4-20mA is optional ), coeffcient of proportionality and incremental compensation.

✧ Using two-point calibration method.

✧ Power off protection＞10 years.

# Technical Parameters

✧ Measuring range： 0-20.00 mg/L（ppm）

✧ Accuracy：±1% or ±0.01 mg/L

✧ 485 interface  support to the internet of things （MODBUS Protocol partial compatibility）

✧ Working condition  Environmental temperature 0-60℃

✧ Input impedance：≥1×10$^{12}$Ω

✧ Output load：4-20mA load ＜750Ω（Optional ）

✧ Working voltage： 5V  or  DC 12V or 24V

✧ Protection grade：IP68

DC5V ＋

RS-485  B

RS-485  A

DC5V－

# Digital ozone 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 | type of data | length | Read/ Write | Instruction |
|---|---|---|---|---|---|
| Display value | R0 | unsigned | 1 | R | （3 decimals） |
| temperature | R1 | unsigned | 1 | R | （3 decimals） |
| 4mA output display value | R2 | unsigned | 1 | R | （3 decimals） |
| 20mA output display value | R3 | unsigned | 1 | R | （3 decimals） |
| Rang lower limit | R4 | unsigned | 1 | R | Default to 0 |
| Rang upper limit | R5 | unsigned | 1 | R | Default 2000 (3decimals) |
| Proportionality factor | R6 | unsigned | 1 | R | （1 decimal） |
| Increment | R7 | signed | 1 | R | （3 decimals） |
| Resolution | R8 | signed | 1 | R | Default to 3 |
| Product identification | R9 | signed | 1 | R | Default to 6 |
| Slave address | R10 | unsigned | 1 | R | Rang between 1-127 |

| | | | | | |
|---|---|---|---|---|---|
| Baud rate | R11 | unsigned | 1 | R | 1200<br>2400<br>4800<br>9600<br>19200<br>38400<br>57600 |
| Function call | R12 | unsigned | 1 | W | Find parameter settings for more details |
| parameter1 | R13 | unsigned | 1 | W | Find parameter settings for more details |
| parameter2 | R14 | unsigned | 1 | W | Find parameter settings for more details |

# MODBUS Instruction format：

This sensor is compatible with 0x03, 0x06, 0x10 function codes of MODBUS

protocol.

0x03 Command Format：

| Definition | Address | Function Code | Initial Address | Number of Register | CRC calibration |
|---|---|---|---|---|---|
| Data | ADDR | 0x03 | Rstart | Rnum | CRC 16 |
| Number of Bytes | 1 | 1 | 2 | 2 | 2 |

0x03 Return Format：

| Definition | Address | Function Code | Number of Data | Data | CRC calibration |
|---|---|---|---|---|---|
| Data | ADDR | 0x03 | Rnum*2 | Data | CRC 16 |
| Number of Bytes | 1 | 1 | 1 | Rnum*2 | 2 |

0x06 Command Format：

| Definition | Address | Function Code | Register Address | Data | CRC calibration |
|---|---|---|---|---|---|
| Data | ADDR | 0x06 | Raddr | Data | CRC 16 |
| Number of Bytes | 1 | 1 | 2 | 2 | 2 |

0x06 Return Format (same as command))：

| Definition | Address | Function Code | Register Address | Data | CRC calibration |
|---|---|---|---|---|---|
| Data | ADDR | 0x06 | Raddr | Data | CRC 16 |
| Number of Bytes | 1 | 1 | 2 | 2 | 2 |

0x10 Command Format：

| Definition | Address | Function Code | Initial Address | Number of Register | Number of Data | Data | CRC calibration |
|---|---|---|---|---|---|---|---|
| Data | ADDR | 0x10 | 0x000C | 0x0003 | 0x06 | Data | CRC 16 |
| Number of Bytes | 1 | 1 | 2 | 2 | 1 | 6 | 2 |

0x10 Return Format：

| Definition | Address | Function Code | Initial Address | Number of Register | CRC calibration |
|---|---|---|---|---|---|
| Data | ADDR | 0x10 | 0x000C | 0x0003 | CRC 16 |
| Number of Bytes | 1 | 1 | 2 | 2 | 2 |

# Data reading：

This sensor data is read using the 0x03 function code of the MODBUS protocol.

**Example:** Reading Ozone value.

**Send command**: 01 03 00 00 00 01 84 0A

**Return:** 01 03 02 1A CC B3 71

The data part is**:** 1A CC

Ozone value**:** Data 0xA CC, converted to decimal in 6860, ozone value is 6.860mg/L, retaining 3 decimal places

# Parameter adjustment：

1. This sensor parameter adjustment uses the 0x06 or 0x10 function code of the MODBUS protocol.

2, using 0x06 function code adjustment parameters are divided into 3 steps

1) Write parameter 1 to the R13 register

2) Write parameter 2 to the R14 register

3) Write the function number to the R12 register

3. Use the 0x10 function code, and write the function number, parameter 1, and parameter 2 to the three registers starting from R12. Equivalent to the step-by-step write effect.

4. When the function call is successful, the R12, R13, and R14 registers are all reset to 0. If the function call fails or the parameters are incorrect, the R14 register will display -1.

# Function call parameter list

| Function | Parameter 1 | Parameter 2 | Function number |
|---|---|---|---|
| Zero Calibration | Zero standard value *1000 | 1 | 1 |
| Slope Calibration | Slope standard value *1000 | 2 | 1 |
| Change the 4-20ma output range (need to be customized） | 4mA Output representative value | 20mA representative value | 3 |
| Change Correction Factor | Scale factor | Display value increment | 5 |
| Change slave configuration | New slave number | New baud rate | 6 |
| Restore Factory Setting | Password 20034 | Arbitrary value | 7 |

**Example**: Ozone calibration (using 0x10 function code)

**Zero calibration:** Ozone velue of standars is.0.5mg/L ， 0.5*1000=500,

Converted to hexadecimal is 0x01F4. Therefore, the function number is 0x0001,

parameter 1 is 0x0000, and parameter 2 is 0x0001.

The data part is**:** 00 01 01 F4 00 01

**Send command:** 01 10 00 0C 00 03 06 00 01 01 F4 00 01 9A B1

Return**:** 01 10 00 0C 00 03 40 0B

**Slope calibration**: Ozone velue of standars is 0.5mg/L ， 0.5*1000=1000,

Converted to hexadecimal is 0x03E8. Therefore, the function number is 0x0001,

parameter 1 is 0x0318, and parameter 2
is 0x0001 The data section is: 00 01 03
E8 00 02
Send command: 01 10 00 0C 00 03 06 00 01 03 E8 00 02 1A CE
Return: 01 10 00 0C 00 03 40 0B.

# Attention and maintenance

1. If the electrode is not used, please store it in a dark, dry and ventilated environment.

2. The measuring electrode is a precision component, which is not decomposable. The shape and size of the electrode cannot be changed, and it is not possible to clean with a strong acid or alkali, so as not to change the electrode constant and affect the accuracy of the meter measurement. The measuring cable is a dedicated cable and cannot be replaced.

3. When measuring the electrode, it should be cleaned in distilled water (or deionized water) first and the filter paper should be used to absorb moisture to prevent impurities from being introduced into the liquid to be tested. Check if the terminal is dry. If there is dirt, please use absolute alcohol. Wipe, use after drying.

4. The electrode is used for a long time, and when a measurement error occurs, it must be calibrated with the meter. Make corrections.

When the calibration and measurement cannot be performed while maintaining and maintaining the electrode in the above manner, the electrode has failed. Please replace the electrode.