



twinno 天诺

## T6040 Polarographic On-line Dissolved Oxygen Meter Operating Manual



上海淳业仪表科技有限公司  
Shanghai Chunye Instrument Technology Co., Ltd

## Content

Preface.....	1
Features.....	2
Technical Specifications.....	3
Instrument installation.....	4
Keypad descriptions.....	7
Display description.....	8
Menu Structure.....	9
Calibration.....	12
Graphic Trend(Trend Chart).....	13
MODBUS RTU General Information.....	14
MODBUS RTU Transmission Mode.....	15
MODBUS RTU CRC Check.....	17
Implementation of MODBUS RTU in Instrument.....	17
Instrument MODBUS RTU function code.....	17
MODBUS function code 0x10: write multiple registers.....	19
Data format in instrument.....	20
Read instruction mode.....	23
Saturated Oxygen Meter in Water at Different Temperatures.....	24
Daily maintenance.....	25
Frequently Asked Questions.....	26
Package Set.....	27
Warranty.....	28
Notes.....	29

## Preface

Thank you for your support to us. Please read the instruction manual carefully before use to help you use our products correctly.

When receiving the instrument, please carefully open the package, check whether the instrument and accessories are damaged by transportation, whether the accessories are complete, if abnormal, please contact our after-sales service department or regional customer service center, and keep the packaging for return processing.

Wiring or repair shall be done by a professional and operate only on instruments with power-off. In the event of an instrument safety problem, power off the instrument immediately to prevent any unintentional operation.

For example, it may be

Unsafe condition:

- 1) Significant damage to the instrument;
- 2) The instrument can not operate properly or provide specified measurements;
- 3) The instrument was stored in an environment with temperature exceeding 70℃ for a long time.

The instrument must be installed by a professional in accordance with relevant local specifications, and the guidance instructions are included in the operating instruction manual. Comply with the technical specification and input grade of the instrument.

## Features

Industrial online dissolved oxygen meter is an online water quality monitor and control instrument with microprocessor. The instrument is equipped with different types of dissolved oxygen sensors. It is widely used in power plants, petrochemical industry, metallurgical electronics, mining, paper industry, food and beverage industry, environmental protection water treatment, aquaculture and other industries. The dissolved oxygen value and temperature value of water solution are continuously monitored and controlled.

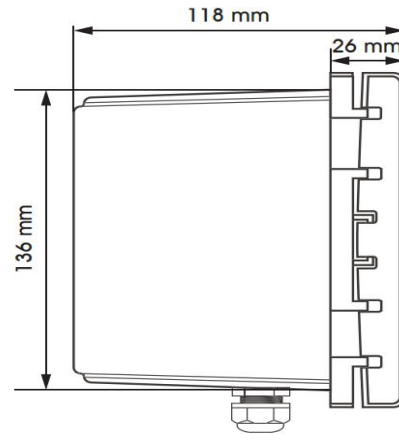
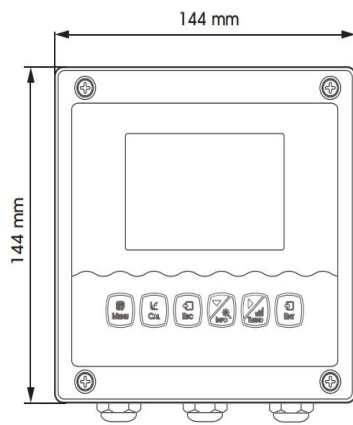
- Color LCD display
- Intelligent menu operation
- Multiple automatic calibration function
- Differential signal measurement mode
- Three relay control switches
- High & low alarm and hysteresis control
- 4-20mA & RS485, Multiple output modes
- Password protection function to prevent misoperation by non-staff.

## Technical Specifications

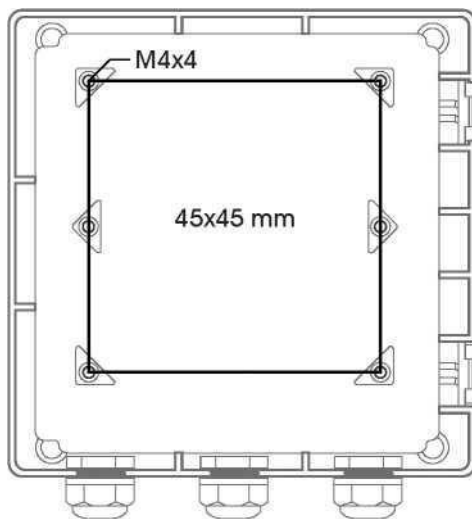
Measurement range	0~40.00mg/L; 0~400.0%
Measurement unit	mg/L; %
Resolution	0.01mg/L; 0.1%
Basic error	±1%F.S
Temperature	-10~150°C
Temperature Resolution	0.1°C
Temperature Basic error	±0.3°C
Current Output	4~20mA,20~4mA,(load resistance<750Ω)
Communication output	RS485 MODBUS RTU
Relay control contacts	5A 240VAC,5A 28VDC or 120VAC
Power supply (optional)	85~265VAC,9~36VDC,power consumption≤3W
Working conditions	No strong magnetic field interference around except the geomagnetic field.
Working temperature	-10~60°C
Relative humidity	≤90%
IP rate	IP65
Instrument Weight	0.8kg
Instrument Dimensions	144×144×118mm
Mounting hole dimensions	138*138mm
Installation methods	Panel,Wall mounted,pipeline

## Instrument installation

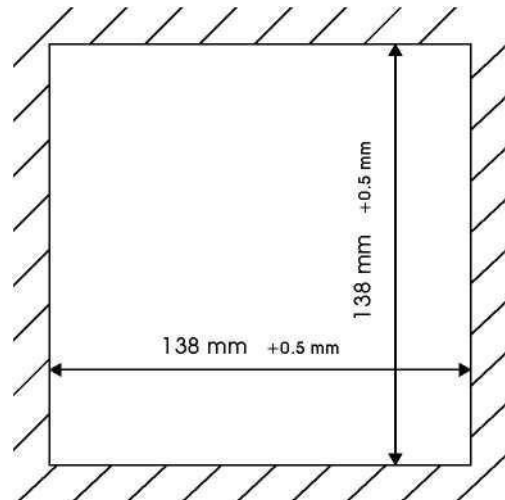
### Installation size



Dimensions of instrument

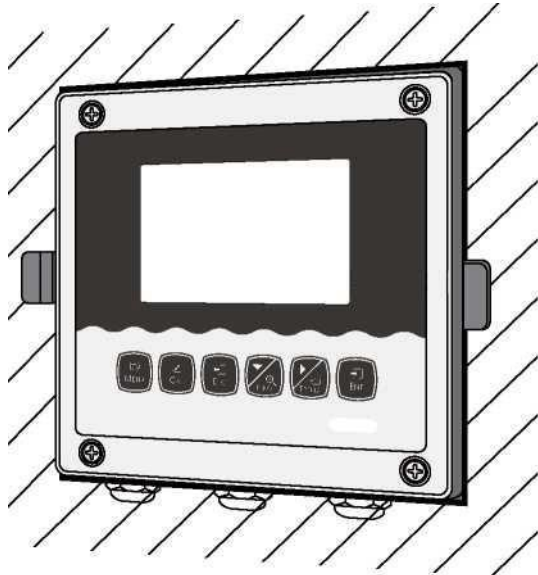


Back fixed hole size



Embedded mounting cut-out size

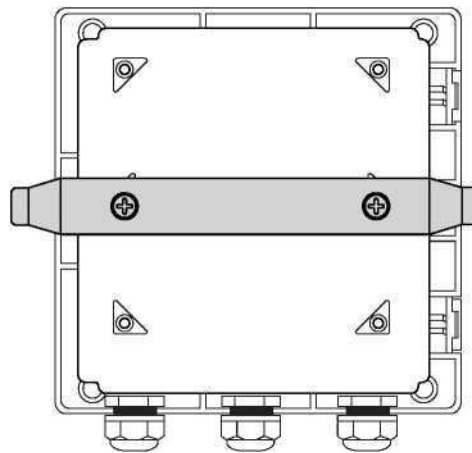
## Instrument installation: Embedded installation



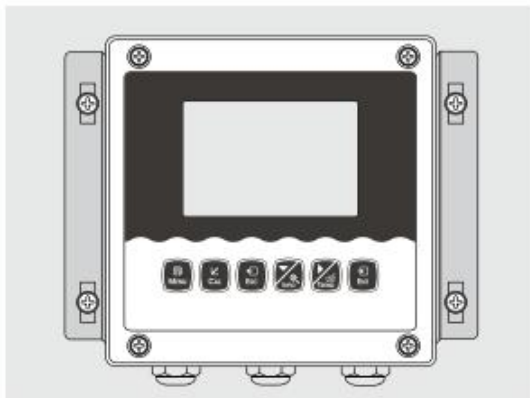
Installation completion diagram



- A.Embedded in the opened hole
- B. Install a fixed frame for the instrument

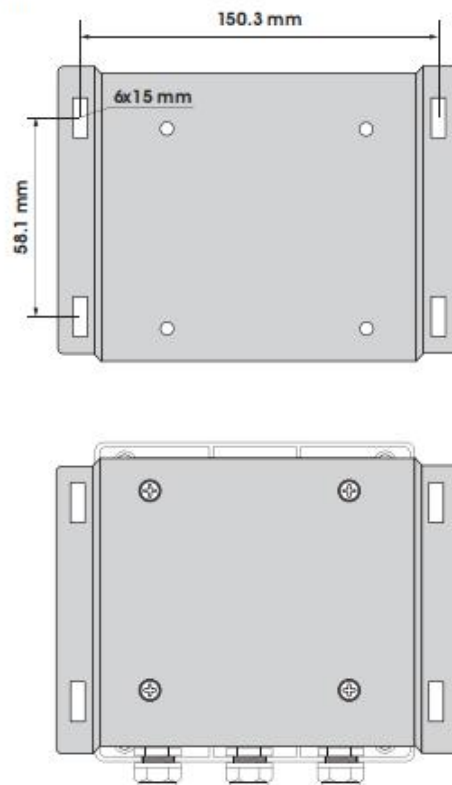
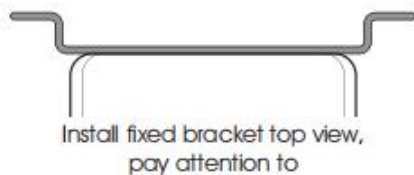


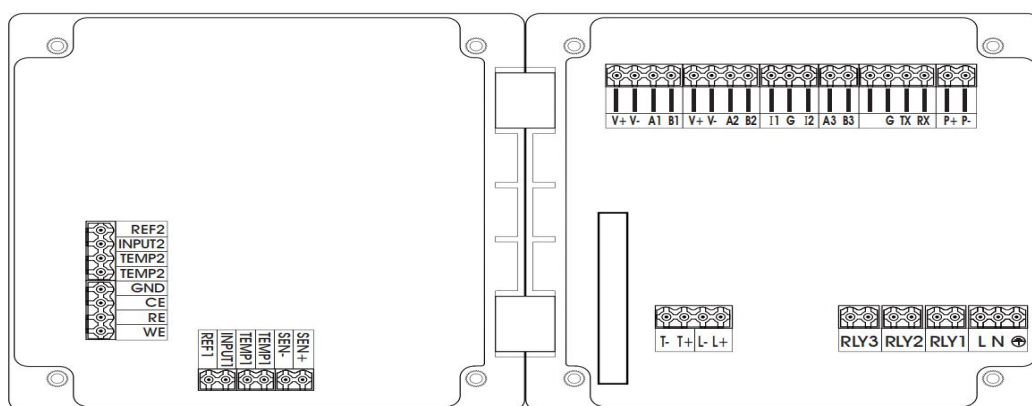
## Instrument installation:Wall mounted installation



Installation completion diagram

- a. Install fixing bracket for instrument
- b.Wall screw fixing





V+,V-,A1,B1	Digital Input Channel 1	REF1	PH/Ion reference1
V+,V-,A2,B2	Digital Input Channel 2	INPUT1	PH/Ion measure1
I 1,G,I 2	Output current	TEMP1	Temperature 1
A3,B3	RS485 communication output	SEN-,SEN+	Membrane dissolution of oxygen/FCL
G,TX,RX	RS232 communication output		
P+,P-	VDC power supply	REF2	PH/Ion reference2
		INPUT 2	PH/Ion measure 2
T2+,T2-	Temperature wiring	TEMP 2	Temperature 2
EC1,EC2,EC3,EC4	Conductivity/Resistivity wiring	GND	Grounding (for testing)
RLY3, RLY2, RLY1	Group 3 relays	CE,RE,WE	Constant voltage for FCL/CLO2/O3
L,N,⚡	L fire wire, N neutral wire, ⚡ geodesic		

Connection between equipment and sensor: The power supply of relay, output signal, alarm contact and connection between sensor and instrument are all inside the instrument. Wiring is done according to Figure 3. The lead length of the cable fixed by the electrode is generally 5-10 meters. Insert the line with corresponding label or color on the sensor into the corresponding wiring terminal inside the instrument and tighten it.

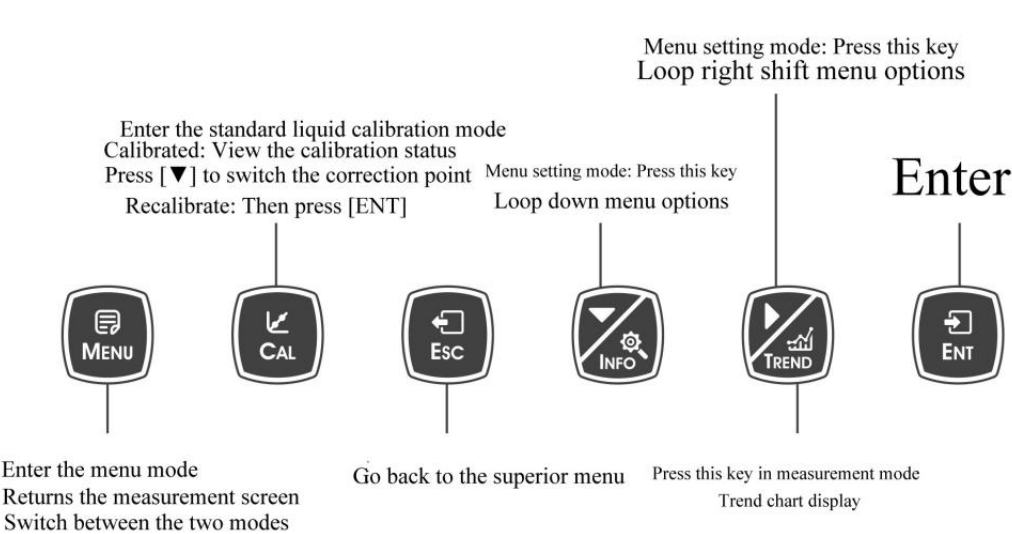


# Keypad descriptions

Keypad operation tips:

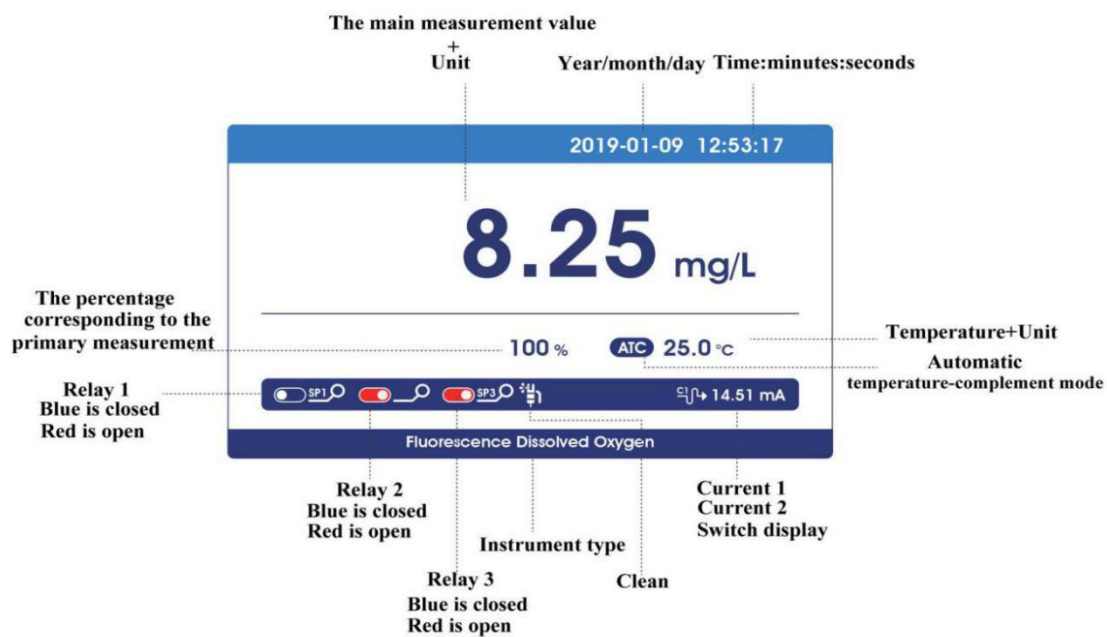
Short Press: Short Press means to release the key immediately after pressing.  
((Default to short presses if not indicated below))

Long Press: Long Press is to press the button for 3 seconds and then release it.

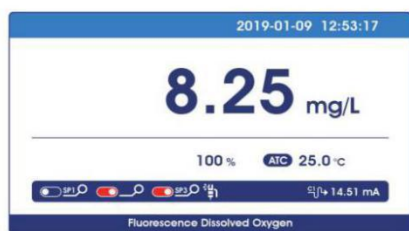


## Display description

Before using should check all the pipe connection and electrical connection, after the power supply, the instrument is shown as:



### Measurement mode



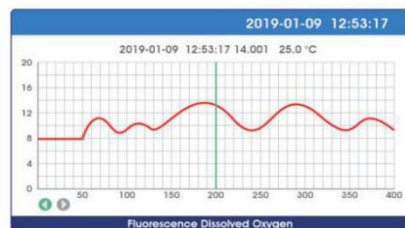
### Setting mode



### Standard mode



### Trend chart display



## Menu Structure

The following is the menu structure of the instrument:

Configure	Sensor	Unit	Mg/L
			%
		Pressure compensation	101.3
		Salinity compensation	0
		Anaerobic oxygen voltage compensation	100
		Saturation oxygen voltage compensation	400
		Saturation oxygen compensation	8.25
	Temperature	Temperature Sensor	NTC2.252 kΩ
			NTC10 kΩ
			Pt100
			Pt1000
		Temperature Offset	0.0000
		Temperature Input	Automatic
			Manual
		Temperature Unit	°C
			°F
Calibration	Standard Solution Calibration	Anaerobic calibration	
		Air Calibration	
		Calibrate correction	Offset Adjustment 一 Slope Adjustment 二
	Field Calibration	Field Calibration	
		Offset Adjustment	
		Slope Adjustment	
Alarm	Relay 1	Status	ON
			OFF
		High/Low Alarm	High Alarm
			Low Alarm
			Cleaning(cleaning time is set in the cleaning output)
		Limit Value	
		Hysteresis	
		Status	ON
			OFF

	Relay 2	High/Low Alarm	High Alarm
			Low Alarm
			Cleaning(cleaning time is set in the cleaning output)
		Limit Value	
		Hysteresis	
	Relay 3	Status	ON
			OFF
		High/Low Alarm	High Alarm
			Low Alarm
			Cleaning(cleaning time is set in the cleaning output)
		Limit Value	
		Hysteresis	
Output	Current 1	Channel	Main
			Temperature
		Output Option	4-20mA
			0-20mA
			20-4mA
		Upper Limit	
		Lower Limit	
	Current 2	Channel	Main
			Temperature
		Output Option	4-20mA
			0-20mA
			20-4mA
		Upper Limit	
		Lower Limit	
	RS485	Baud Rate	4800BPS
			9600BPS
			19200BPS
		Parity Check	None
			Odd
			Even
		Stop Bit	1 Bit
			2 Bit
		Network Node	001+
Data Log	Graphic Trend (Trend Chart)	1h	Display 480 points/screen according to interval settings
		12h	
		24h	
	Record Query	Input year/month/day to query	Year/Month/Day,Time:Minutes/Seconds Value Unit

	Record Interval	7.5s	
		90s	
		180s	
	Memory information	101600point	
	Data Output		
System	Language	Chinese	
		English	
	Date/Time	Year-Month-Day	
		Hour-Minute-Second	
	Display	Display Speed	Low
			Standard
			Medium
			High
		Backlight	Saving
			Bright
	Soft Version	Soft Version	19-1.0
		Password Settings	0000
		Serial Number	
	Factory Default	1.No	
		2.Yes	
	Terminal Current Tuning	Current 1 4mA	(The positive and negative ends of the ammeter are connected to the current 1 or current 2 output terminals of the instrument respectively, press 【▼】 key to adjust the current to 4 mA or 20mA ,press 【ENT】 key to confirm.)
		Current 1 20mA	
		Current 2 4mA	
		Current 2 20mA	
	Relay Test	Relay 1	(Select three groups of relays and hear the sound of two switches, the relay is normal.)
		Relay 2	
		Relay 3	

## Calibration

Press **[MENU]** to enter the setting mode and select the calibration:

Calibration	Standard Solution Calibration	Anaerobic calibration
		Air calibration
	Field Calibration	Field Calibration
		Offset Adjustment
		Slope Adjustment

### Calibration of Standard Solution

Select the way of Calibration, press the **[ENT]** key to enter the Standard Solution Calibration. Or press the **[CAL]** button to enter the calibration mode of the Standard Solution Calibration when in the measure screen.

If the monitor prompts you to enter the calibration security password, press the **[▼]** key or **[▶]** key to set the calibration security password, and then press the **[ENT]** key to confirm the calibration security password.



Zero calibration



Air calibration

Anaerobic calibration: after entering the calibration mode, the instrument display is shown in the figure as above. Put the electrode with film cap into the Anaerobic water (the matching electrolyte shall be injected into the film cap), and the corresponding "Signal" value will be displayed on the left side of the screen. Press **[ENT]** when "Signal" value is stable. During the calibration process, **Done** means succeed, **Calibrating** means continue, **Err** means failure. Press **[ESC]** to go back when it is finished.

Air calibration: after entering the calibration mode, the instrument display is shown in the figure as above. Put the electrode with film cap in the air (the matching electrolyte shall be injected into the film cap), and the corresponding "Signal" value will be displayed on the left side of the screen. Press **[ENT]** when "Signal" value is stable. During the calibration process, **Done** means succeed, **Calibrating** means continue, **Err** means failure. Press **[ESC]** to go back when it is finished.

## Field calibration

Select field calibration mode: [field calibration], [Offset adjustment], [linear adjustment].

When the data from laboratory or portable instrument are input into this item, the instrument will automatically correct the data. Input data by **【▼】** **【▶ /TREND】**, press **【ENT】** to calibrate, **Done** means succeed, Press **【ESC】** to exit.



## Offset adjustment

Compare the data detected by laboratory or portable instrument with the data measured by instrument. If there is any error, the error data can be modified by this function.

## linear adjustment

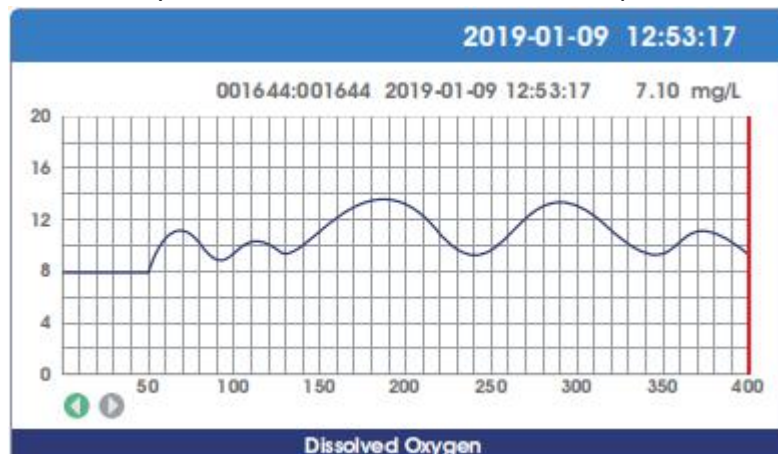
The linear value after field calibration will be saved in this item, and the factory data is 1.00.



## Graphic Trend(Trend Chart)

Press **【Menu】** key to enter the setting mode, set the recording interval, and the instrument will save the data according to the selected recording interval time.

Data Log	Graphic Trend (Trend Chart)	Record intervals/points	400 points/screen. Displays the most recent data trend graph according to record interval Settings.
		1h/point	400 points/screen. Displays the last 16 days data trend graph.
		12h/point	400 points/screen. Displays the last 200 days data trend graph.
		24h/point	400 points/screen. Displays the last 400 days data trend graph.
	Record Query	Input year/month/day to query	Year/Month/Day,Time:Minutes/Seconds Value Unit
	Record Interval	7.5s	Store data every 7.5 seconds
		90s	Store data every 90 seconds
		180s	Store data every 180 seconds

Press the **【Menu】** button returns to the measurement screen. Press the **【▶ /TREND】** button in the measurement mode to view the trend chart of the saved data directly. There are 400 sets of data record per screen.



In the current mode, press the **【ENT】** key to move the data display line to the left and right (red). Long pressing of the **【ENT】** key can accelerates displacement. (When the bottom icon   is green, [ENT] key is displacement direction, press **【▶ /TREND】** key to switch the direction of displacement ), and press **【▼/INFO】** to switch the display range (enlarge/shrink).

## MODBUS RTU General Information

### Overview

The hardware version number of this document is V2.0; the software version number is V5.9 and above. This document describes the MODBUS RTU interface in details and the target object is a software programmer.

### MODBUS command structure

Data format description in this document;

Binary display, suffix B, for example: 10001B

- decimal display, without any prefix or suffix, for example: 256

Hexadecimal display, prefix 0x, for example: 0x2A

ASCII character or ASCII string display, for example: "YL0114010022"



## Command Structure

The MODBUS application protocol defines the Simple Protocol Data Unit (PDU), which is independent of the underlying communication layer.

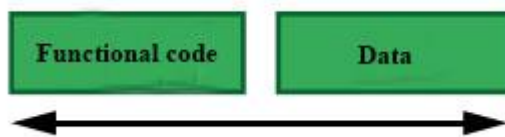


Figure 1: MODBUS Protocol Data Unit

MODBUS protocol mapping on a specific bus or network introduces additional fields of protocol data units. The client that initiates the MODBUS exchange creates the MODBUS PDU, and then adds the domain to establish the correct communication PDU.

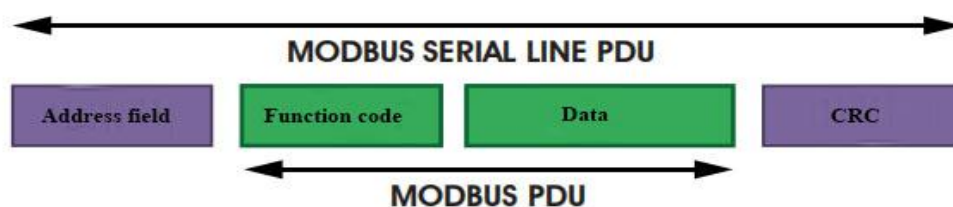


Figure 2: MODBUS architecture for serial communication

On the MODBUS serial line, the address domain contains only the slave instrument address. Tips:

The device address range is 1...247

Set the device address of the slave in the address field of the request frame sent by the host.

When the slave instrument responds, it places its instrument address in the address area of the response frame so that the master station knows which slave is responding.

Function codes indicate the type of operation performed by the server.

CRC domain is the result of the “redundancy check” calculation, which is executed according to the information content.

## MODBUS RTU Transmission Mode

When the instrument uses RTU (Remote Terminal Unit) mode for MODBUS serial communication, each 8-bit byte of information contains two 4-bit hexadecimal characters. The main advantages of this mode are greater character density and better data throughput than the ASCII mode with the same baud rate. Each message must be transmitted as a continuous string.

The format of each byte in RTU mode (11 bits):

Coding system: 8-bit binary

Each 8-bit byte in a message contains two 4-bit hexadecimal characters (0-9, A-F)

Bits in each byte: 1 starting bit

8 data bits, the first minimum valid bits without parity check bits

2 stop bits

Baud rate: 9600 BPS

How characters are transmitted serially:

Each character or byte is sent in this order (from left to right) the least significant bit (LSB)... Maximum Significant Bit (MSB)

<b>Start bit</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>Stop bit</b>	<b>Stop bit</b>
------------------	----------	----------	----------	----------	----------	----------	----------	----------	-----------------	-----------------

**Figure 3: RTU pattern bit sequence**

**Check Domain Structure:** Cyclic Redundancy Check (CRC16)

**Structure description:**

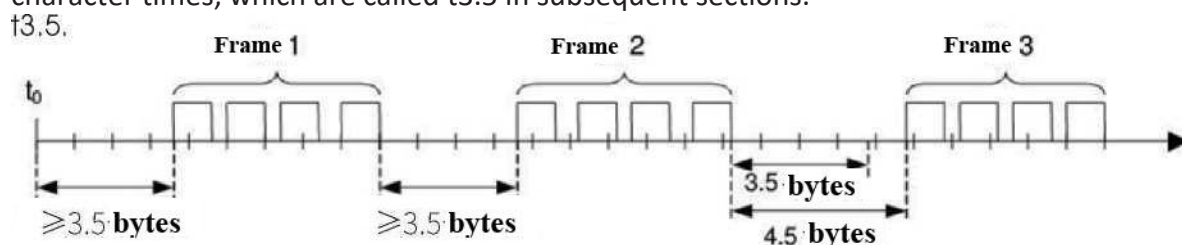
Instrument	Address	Data	CRC	
1 byte	1 byte	0...252 byte	2 byte	
			CRC Low byte	CRC High byte

**Figure 4: RTU information structure**

The maximum frame size of MODBUS is 256 bytes

MODBUS RTU Information Frame

In RTU mode, message frames are distinguished by idle intervals of at least 3.5 character times, which are called t<sub>3.5</sub>.

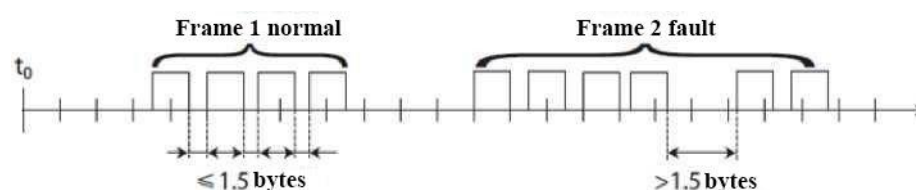


Start	Address	Function code	Data	CRC	Stop
$\geq 3.5$ bytes	8	8	Nx8	16	$\geq 3.5$ bytes

**Figure 5: RTU message frame**

The entire message frame must be sent in a continuous character stream.

When the pause time interval between two characters exceeds 1.5 characters, the information frame is considered incomplete and the receiver does not receive the information frame.



**Figure 6: Frame data transmission**

## MODBUS RTU CRC Check

The RTU mode contains an error-detection domain based on a cyclic redundancy check (CRC)

algorithm that performs on all message contents. The CRC domain checks the contents of the entire message and performs this check regardless of whether the message has a random parity check. The CRC domain contains a 16-bit value consisting of two 8-bit bytes. CRC16 check is adopted..Low bytes precede, high bytes precede.

## Implementation of MODBUS RTU in Instrument

According to the official MODBUS definition, the command starts with a 3.5 character interval

triggering command, and the end of the command is also represented by a 3.5 character interval.

The device address and MODBUS function code have 8 bits. The data string contains n\*8 bits, and the data string contains the starting address of the register and the number of read/write registers. CRC check is 16 bits.

Value	Start	Device address	Function code	Data	Summary Check		End
	No signal bytes during 3.5 characters	1-247 1	Function codes conforming to MODBUS specification	Data conforming to MODBUS specification	CRCL	CRCL	No signal bytes during 3.5 characters
Byte	3.5		1	N	1	1	3.5

**Figure 7: MODBUS definition of data transmission**

## Instrument MODBUS RTU function code

The instrument only uses two MODBUS function codes:

0x03: Read-and-hold register

0x10: Write multiple registers

MODBUS Function Code 0x03: Read-and-hold Register

This function code is used to read the continuous block content of the holding register of the remote device. Request the PDU to specify the start register address and the number of registers. Address registers from zero. Therefore, the addressing register 1-16 is 0-15. The register data in the response information is packaged in

two bytes per register. For each register, the first byte contains high bits and the second byte contains low bits.

Request

Function code	1 byte	0x03
Start Address	2 bytes	0x0000....0xffff
Read register number	2bytes	1...125

Figure 8: Read-and-hold register request frame

Response

Function code	1 byte	0x03
Start Address	2 bytes	0x0000....0xffff
Read register number	2bytes	1...125

N = Register number

**Figure 9: Read-and-hold register response frame**

The following illustrates the request frame and response frame with the read and hold register 108-110 as an example. (The contents of register 108 are read-only, with two byte values of 0X022B, and the contents of register 109-110 are 0X0000 and 0X0064)

Request Frame		Response Frame	
Number Systems	(Hexadecimal)	Function code	(Hexadecimal)
Function code	0x03	Byte count	0x03
Start address (high byte)	0x00	Register Value (High Bytes) (108)	0x06
Start address (low byte)	0x6B	Register Value (Low Bytes)(108)	0x02
Number of Read Registers (High Bytes)	0x00	Register Value (High Bytes) (109)	0x2B
Number of Read Registers (Low Bytes)	0x00	Register Value (Low Bytes) (109)	0x00
	.	Register Value (High Bytes)(110)	0x00
		Register Value (Low Bytes) (110)	0x00

		Function code	0x64
--	--	---------------	------

**Figure 10: Examples of read and hold register request and response frames**

## MODBUS function code 0x10: write multiple registers

This function code is used to write continuous registers to remote devices (1... 123 registers) block that specifies the value of the registers written in the request data frame. Data is packaged in two bytes per register. Response frame return function code, start address and number of registers written.

### Request

Function code	1 byte	0x10
Start Address	2 bytes	0x0000....0xffff
Number of input registers	2 bytes	0x0001....0x0078
number of bytes	1 byte	N×2
Register values	N×2 bytes	Value

N = Register number

**Figure11:Write multiple register request frames**

### Response

Function code	1 byte	0x10
Start Address	2 byte	0x0000....0xffff
Register number	2 byte	1...123(0x7B)

N = Register number

**Figure 12: write multiple register response frames**

The request frame and response frame are illustrated below in two registers that write the values

0x000A and 0x0102 to the start address of 2.

Request Frame	(Hexadecimal)	Response Frame	(Hexadecimal)
Number Systems	0x10	Number Systems	0x10
Function code	0x00	Function code	0x00
Start address (high byte)	0x01	Start address (high byte)	0x01
Start address (low byte)	0x00	Start address (low byte)	0x00
Input register number (high bytes)	0x02	Input register number (high bytes)	0x02

Input register number (low bytes)	0x04	Input register number (low bytes)	
number of bytes	0x00		
Register value (high byte)	0x0A		
Register value (low byte)	0x01		
Register value (high byte)	0x02		
Register value (low byte)			

**Figure 13: Examples of writing multiple register request and response frames**

## Data format in instrument

### Overview

Floating Point

Definition: Floating point, conforming to IEEE 754 (single precision)

Description	Symbol	Index	Mantissa	SUM
Bit	31	30...23	22...0	22...0
Index Deviation	127			

**Figure 14: floating point single-precision definition (4 bytes, 2 MODBUS registers)**

Example: Compile decimal 17.625 to binary

Step 1: Converting 17.625 in decimal form to a floating-point number in binary form, first finding the binary representation of the integer part

$$17_{\text{decimal}} = 16 + 1 = 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

The binary representation of integer part 17 is 10001B

then the binary representation of decimal part is obtained

$$0.625 = 0.5 + 0.125 = 1 \times 2^{-2} + 0 \times 2^{-1} + 1 \times 2^{-3}$$

The binary representation of decimal part 0.625 is 0.101B.

So the binary floating point number of 17.625 in decimal form is 10001.101B

Step 2: Shift to find the exponent.

Move 10001.101B to the left until there is only one decimal point, resulting in 1.0001101B, and

$10001.101B = 1.0001101B \times 2^4$ . So the exponential part is 4, plus 127, it becomes 131, and its binary representation is 10000011B.

Step 3: Calculate the tail number

After removing 1 before the decimal point of 1.0001101B, the final number is 0001101B (because

before the decimal point must be 1, so IEEE stipulates that only the decimal point behind can be recorded). For the important explanation of 23-bit mantissa, the first (i.e. hidden bit) is not compiled.

Hidden bits are bits on the left side of the separator, which are usually set to 1 and suppressed.

Step 4: Symbol bit definition

The sign bit of positive number is 0, and the sign bit of negative number is 1, so the sign bit of 17.625 is 0.

Step 5: Convert to floating point number

1 bit symbol + 8 bit index + 23-bit mantissa

0 10000011 00011010000000000000000B (the hexadecimal system is shown as 0x418d0000)

Reference code:

1. If the compiler used by the user has a library function that implements this function, the library function can be called directly, for example, using C language, then you can directly call the C library function memcpy to obtain an integer representation of the floating-point storage format in memory. For example: float floatdata; // converted floating point number

```
void* outdata;
```

```
memcpy(outdata,&floatdata,4);
```

Suppose floatdata = 17.625

If it is a small-end storage mode, after executing the above statement, the data stored in the address unit outdata is 0x00.

address unit (outdata + 1) stores data as 0x00

address unit (outdata + 2) stores data as 0x8D

address unit (outdata + 3) stores data as 0x41

If it is large-end storage mode, after executing the above statement, the data stored in outdata of address unit is 0x41

address unit (outdata + 1) stores data as 0x8D

address unit (outdata + 2) stores data as 0x00

address unit (outdata + 3) stores data as 0x00

2. If the compiler used by the user does not implement the library function of this function, the

following functions can be used to achieve this function:

```
void memcpy(void *dest,void *src,int n)
{
char *pd = (char *)dest; char *ps = (char *)src;
for(int i=0;i<n;i++)    *pd++ = *ps++;
}
```

And then make a call to the above memcpy(outdata,&floatdata,4);

Example: Compile binary floating-point number 0100 0010 0111 1011 0110 0110 0110 0110B to

decimal number

Step 1: Divide the binary floating-point number 0100 0010 0111 1011 0110 0110 0110 0110B into symbol, bit, exponential bit and mantissa bit.

0 10000100 11110110110011001100110B

1-bit sign + 8-bit index + 23-bit tail sign bit S: 0 denotes positive number

Index position E:  $10000100B = 1 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 0 \times 2^0$   
 $= 128 + 0 + 0 + 0 + 0 + 4 + 0 + 0 = 132$

Mantissa bits M: 11110110110011001100110B=8087142

Step 2: Calculate the decimal number

$D = (-1) \times (1.0 + M/223) \times 2^{E-127}$   
 $= (-1)0 \times (1.0 + 8087142/223) \times 2^{132-127}$   
 $= 1 \times 1.964062452316284 \times 32$   
 $= 62.85$

Reference Code:

```
float floatTOdecimal(long int byte0, long int byte1, long int byte2, long int byte3)
{
    long int realbyte0,realbyte1,realbyte2,realbyte3; char S;
    long int    E,M;
```

```
float D;realbyte0 = byte3; realbyte1 = byte2; realbyte2 = byte1; realbyte3 = byte0;
```

```
if((realbyte0&0x80)==0)
{
    S = 0;//positive number
}
else
{
    S = 1;//negative number
}
E = ((realbyte0<<1)|(realbyte1&0x80)>>7)-127;
```



```

M = ((realbyte1&0x7f) << 16) | (realbyte2<< 8)| realbyte3; D = pow(-1,S)*(1.0 +
M/pow(2,23))* pow(2,E);
return D;
}

```

Function description: parameters byte0, byte1, byte2, byte3 represent 4 bytes of binary floating point number (

the return value     Converted the decimal number

For example, the user sends the command to get the temperature value and dissolved oxygen value

to the probe. The 4 bytes representing the temperature value in the received response frame are 0x00, 0x00, 0x8d and 0x41. Then the user can get the decimal number of the corresponding temperature value through the following call statement.

That is temperature = 17.625.

```
float temperature = floatTOdecimal( 0x00, 0x00, 0x8d, 0x41)
```

## Read instruction mode

The communication protocol adopts MODBUS (RTU) protocol. The content and address of the

communication can be changed according to the needs of customers.

The default configuration is network address 01, baud rate 9600, even check, one stop bit, users

can set their own changes;

Function code 0x04: This function enables the host to obtain real-time measurements from slaves,

which are specified as single-precision floating-point type (i.e. occupying two consecutive register

addresses), and to mark the corresponding parameters with different register addresses.

Communication address is as follows:

0000-0001: Temperature value

0002-0003: Main Measured Value

0004-0005: Temperature and Voltage Value

0006-0007: Main Voltage Value

Communication examples:

Examples of function code 04 instructions:

Communication address = 1, temperature = 20.0, ion value = 10.0, temperature voltage =

100.0, ion voltage = 200.0

Host Send: 01 04 00 00 08 F1 CC

Slave Response: 01 04 10 00 00 41 A0 00 00 41 20 00 00 42 C8 00 00 43 48 81 E8

Note:

[01] Represents the instrument communication address;

[04] Represents function code 04;

[10] represents 10H (16) byte data;

[00 00 00 41 A0] = 20.0; / temperature value

[00 00 41 20] = 10.0; // Main Measured Value

[00 00 42 C8] = 100.0; / / Temperature and Voltage Value

[00 00 43 48] = 200.0; / / Main measured voltage value

[81 E8] represents CRC16 check code;

## Saturated Oxygen Meter in Water at Different Temperatures

TEMP °C	DO mg/L	TEMP °C	DO mg/L	TEMP °C	DO mg/L
0	14.64	14	10.30	28	7.82
1	14.22	15	10.08	29	7.69
2	13.82	16	9.86	30	7.56
3	13.44	17	9.64	31	7.46
4	13.09	18	9.46	32	7.30
5	12.74	19	9.27	33	7.18
6	12.42	20	9.08	34	7.07
7	12.11	21	8.90	35	6.95
8	11.81	22	8.73	36	6.84
9	11.53	23	8.57	37	6.73
10	11.26	24	8.41	38	6.63
11	11.01	25	8.25	39	6.53
12	10.77	26	8.11		
13	10.53	27	7.96		

Note: this table is from appendix C of JJG291-1999.

The dissolved oxygen content can be calculated at different atmospheric pressures as follows.

## Daily maintenance

Generally, the instrument does not need daily maintenance. If there is any fault, you can contact our company and carry out adjustment and repair under the guidance of our technical personnel. If the user has no check condition or needs maintenance, please contact the manufacturer.

Please pay attention to the following points in use and maintenance:

- (1) Anaerobic calibration: Place the electrode in 5% sodium sulfite solution. The closer the display value is near to zero the better.
- (2) Air calibration: The displayed value corresponds to the saturated dissolved oxygen value at the current temperature. If the difference is large, the zero oxygen and calibration in 100% air can be repeated twice.
- (3) The maintenance of the sensor is very simple, generally no maintenance is required, only when the reading is abnormal. Take out the sensor from the sewage and rinse the membrane cap with clean water. Please be careful when washing the fluorescent membrane cap.

## Frequently Asked Questions

### **1.LCD display is not bright**

Possible causes:Instrument or LCD Screen power supply failure.

Solutions:Check whether the power supply is connected or not, and check whether the power

supply wire of the sensor is connected in the wrong direction.

### **2.No current output**

Possible causes:It could be a fault in the current module or a wiring fault.

Solutions:Please check that the current output wiring is correct. Please refer to the wiring terminal

diagram in the instructions.

### **3.The output current of the transmitter does not match the display current.**

Possible causes:Current output may not be correctly calibrated.

Solutions:Please re-calibrate the 20mA output.

### **4.The instrument shows"???"**

Possible causes:The transmitter and sensor are not communicating properly.

Solutions:Check that the sensor signal cable is correct. Please refer to the wiring diagram in the

manual.

### **5.Measurements display results fluctuate greatly.**

Possible causes:Sensor wiring error or low display rate setting.

Solutions:Check wiring or increase display rate appropriately

## Package Set

Product Description	Quantity
1) T6040 Online Dissolved Oxygen Meter	1
2) Instrument Installation Accessories	1
3) Operating Manual	1
4) Qualification Certificate	1

## Warranty

We guarantee that there will be no significant deviation between material and process within one year from the date of purchase.

During the warranty period, if necessary repair is not caused by improper use or misoperation, please pay the transportation fee to return the instrument, and we will repair it free of charge.

Our customer service department will confirm whether the product problem is caused by the deviation of the product itself or the improper use of the customer. Maintenance of products beyond the warranty period will be charged on a replacement basis.

The above warranties are our only valid warranties and supersede all other warranties, express or implied, including any implied, unrestricted warranties of merchantability or fitness for a particular purpose.

We shall not be responsible for any loss, compensation, expense or damage caused by the negligence or other ACTS of the buyer or any third party.

In no event shall our liability, whatever the cause of action, exceed the cost of the product in question, whether based on contract, warranty, indemnity or infringement (including negligence).

For any reason the product repair must be applied by repair card (RIR) and approved by our customer service department can be returned.

Apply for approval of repair, the name, quantity and reason must specify repair, repair the packing of the goods must be carefully to avoid damage in transit and the insurance.

Our company no any bear responsibility for the damage caused by poor packing.

Instruments should be used product repair, the original packaging, should use bubble bag with a corrugated paper boxes, best to attach a brief explanation of convenient for customer service and the product

## Notes

Distinguished users, please pay attention to the following points when using the instrument, in order to ensure the life and accuracy of the instrument.

- ◆ Careful handling to avoid collision and falling instruments in use.
- ◆ Avoid contact with water or other liquids during use.
- ◆ Don't put the instrument in the sunshine for a long time. After use, it should be stored in a cool, dry and ventilated place.
- ◆ If you don't use the instrument for a long time, you should unplug the power supply to avoid accidents.
- ◆ This instrument is not suitable for use in harsh environment, high temperature, low temperature or strong magnetic field interference, which may lead to instrument damage.
- ◆ If there is any problem with the instrument, please contact the dealer or the company. Do not disassemble the instrument by yourself. If disassembled, the company will no longer be responsible for the warranty.



上海淳业仪表科技有限公司  
**Shanghai Chunye Instrument Technology Co.,Ltd**

Tel: 021-61621082

Fax: 021-61621099

Web: [www.twinno.net](http://www.twinno.net)

Add: Building 6, No.166 Mindong Road, Pudong New District, Shanghai, China

Post code:201209

---