

CON3500 Conductivity / TDS / Salinity Controller / Transmitter

Operating Manual



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catalogue

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10. Unit code sheet

unit	Code hexadecimal	Code decimal	unit	Code hexadecimal	Code decimal
mV	0x00	0	ug/L	0x0D	13
nA	0x01	1	mg/L	0x0E	14
uA	0x02	2	g/L	0x0F	15
mA	0x03	3	ppb	0x10	16
Ω	0x04	4	ppm	0x11	17
KΩ	0x05	5	ppt	0x12	18
MΩ	0x06	6	%	0x13	19
uS/cm	0x07	7	mbar	0x14	20
mS/cm	0x08	8	bar	0x15	21
S/cm	0x09	9	mmHg	0x16	22
pH	0x0A	10			
°C	0x0B	11			
°F	0x0C	12			

14、 The conductivity standard solution corresponds to different temperatures

	temperature (°C)	S/cm
1413μS/cm	15.0	0.001147
	18.0	0.001226
	20.0	0.001279
	25.0	0.001413
	35.0	0.001694
12.85mS/cm	15.0	0.01046
	18.0	0.01117
	20.0	0.01165
	25.0	0.01285
	35.0	0.01533

9. Communication parameter setting

The parameters in the instrument setting menu can be set through the communication function, They are located in the holding register group and the control transfer register group. The holding register group is written with 0x06 function code, and the control transfer register group is written with 0x10 function code. You can refer to the corresponding section.

When setting these parameters, the instrument should be in the menu state of the setting mode. Therefore, in the measurement mode, the calibration mode code 0x0050 is first written to the operating mode register (address 64) to bring the instrument into the setting mode.

If the password is not set (0000), the instrument goes directly to the Settings menu (Work event register (address 66) value is 1)

If the password is set (the password is not 0000), then the instrument displays the password data interface (the working event register (address 66) value is 0). The password can be written in the working mode parameter register (address 65), and the password is correct before entering the setting menu.

Set the menu interface to write the following values to the working mode parameter register (address 65) and perform corresponding operations

0x7FFF: The instrument performs factory operation

0x7FFE: The instrument performs a restart operation

1、 To inform the user

Thank you for supporting your company. Please read the instructions in detail to help you use your products correctly.

2、 Product inspection

Carefully open the package, check whether the instrument is damaged, and whether the accessories are complete, please contact the dealer or our company immediately.

Under any circumstances, the instrument shall not be removed, if such behavior, the company is no longer responsible for the warranty.

3、 Instrumentation profile

- 128 * 64 dot matrix LCD display, Chinese, switchable and English, IP65 protection level, all-weather stable operation
- simple menu design, simple and convenient operation, graphical prompt, beautiful and clear interface
- The ● software has adjustable digital filtering, hardware resistance, and enhanced interference capability, making the measurement more stable and adaptable to complex industrial environments
- global access to power supply 85~260VAC, but also customized DC 18~36V DC
- RS-485 digital interface, MODBUS-RTU communication protocol, read and write two-way communication, can realize the remote complete control of the instrument
- electrical conductivity (CON), total solid dissolution volume (TDS), salinity (SAL) three measurement modes

4、technical parameter

conductivity	Measurement range (resolution)	0.000 ~ 4.000uS/cm (0.001uS/cm)
		0.00 ~ 40.00uS/cm (0.01uS/cm)
		0.0 ~ 400.0uS/cm (0.1uS/cm)
		0 ~ 4000uS/cm (1uS/cm)
0.00 ~ 40.00mS/cm (0.01mS/cm)		
		0.0 ~ 400.0mS/cm (0.1mS/cm)
	Measurement accuracy	±1%F.S (electronic unit)
	The electrode constant	0.01/0.1/1/10
TDS/ salinity	measuring range	Conductivity range * Set the conversion coefficient
temperature	measuring range	-10.0~130℃.0
	resolution ratio	0.1℃
	certainty of measurement	±0.3℃
	Temperature input	PT1000
	temperature compensation	Automatic / manual
Transform current	Output type	Two roads of 4~20 mA (the corresponding range can be set)
	Current accuracy	±0.5% F .S
	output loading	Less than 500 Ω
control	Functional relays	1 (can be set to the cleaning or alarm function)
	Switch volume relay	2 SPST relays
	load capacity	2.5A 230VAC
data transmission	coffret	One-way RS485 isolation voltage of 2500Vrms
	protocol	MODBUS-RTU (Read and write duplex communication)
Other parameters	working power supply	85~260VAC or 18~36VDC (user-optional before ordering)
	working temperature	0~60℃
	Working humidity	Relative humidity was <90%
	levels of protection	IP65
	way to install	Dial installation
	outline dimension	(H×W×D) 108×108×132 mm
	Open hole size	92.592.5 mm (positive tolerance)

Step 3: Take the whole type. Just noring decimal points and units. The integer value is obtained at 129.

8. Communication control calibration

① Calibration step instructions

Users can use the communication function to control the instrument and complete the electrode calibration operation. Please read the calibration mode section for the electrode calibration rules. The communication calibration steps are as follows.

- Step 1: Place the electrode into the standard solution.
- Step 2: Write the standard fluid code in the measurement mode or under the calibration menu to the electrode calibration state (address 67) or Calibration condition (address 25) register, to initiate the calibration.

- Step 3: Read the Calibration Status Register (Address 67), The register values correspond to the calibration state as follows,

0x0000: Calibrated successfully (calibration menu returned)

0x0001: Calibrating (calibration status register is read later)

0x0002: Wrong standard fluid (returned to calibration menu)

0x0003: Calibration measurement signal failed (stable for long time (180 seconds) (returned to calibration menu)

0x0004: Electrode slope out of range (calibration menu returned)

If the calibration is not successful, recalibrate by excluding errors according to the calibration status. If required to return to the measurement mode, available in the Write the measurement mode code 0x0010 in the working mode register (address 64). The electrode calibration situation and electrode slope can be viewed in the holding register group at any time.

② Standard liquid code

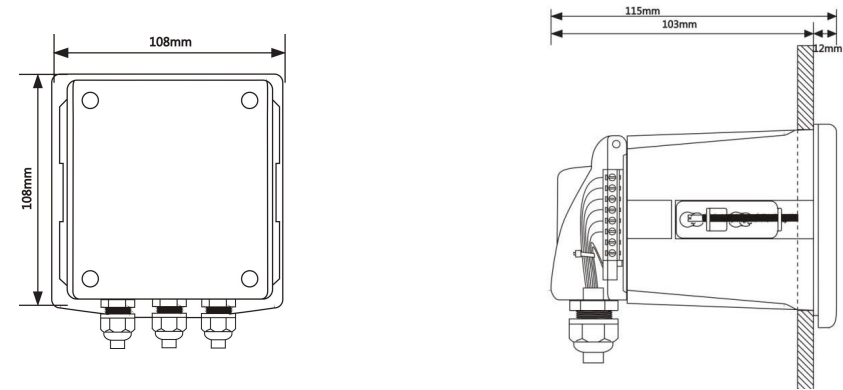
Standard liquid code shall be written in integer format and consistent with the current decimal and unit of measurement range.

For example, the current measured conductivity range is 400.0mS/cm and wants to write a value of 12880uS / cm.

Step 1 : Unit consistent. Converts the write value units to the units of the current measurement range. The same word is the 12.880mS/cm.

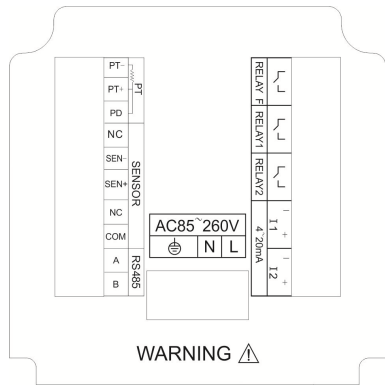
Step 2 : The decimal is the same. The same decimal place as the measurement range (rounded), 12.9mS/cm.

5、Instrument installation method



1. Install the opening size 92.5×92.5mm (positive tolerance)
2. It is recommended that the power cord use 0.5 to 1 square meters of wire, passing through the waterproof harness wire head in the middle, with a certain length margin.

6、Terminal label



binding post	function	binding post	function
PT-	PT1000 minus-end	RELAYF	Functional Relay (cleaning / alarm)
PT+	PT1000 positive end	RELAY1	Relay 1
PD	The PT1000 driver end	RELAY2	Relay 2
NC		I1-	4~20mA Output channel 1, minus end
SEN-	Negative conductivity	I1+	4~20mA Output channel 1, at the positive end
SEN+	The conductivity is positive	I2-	4~20mA Output channel 2, at the minus end
NC		I2+	4~20mA Output Channel 2, plus end
COM	Signal common end, can be connected to the electrode shield wire		Power grounding wire
A	RS-485 Communication T / R +	N	Power zero line
B	RS-485 Communication T / R-	L	Power line

Note: 1. This wiring diagram is illustrated by the 220V AC current. If the user has customized the 24V DC current, please note the instrument power indication tag.

is as follows, defined in 16 decimal mode.

0x0001: 0x0002: 0x0003: 0x0004: 0x0006:

- Address 66: Work event, this register value reflects an event where the current instrument is in working mode, which the user generally does not care about.
- Address 67: Calibration status, used for electrode calibration operation, refer to the Communication Control Calibration Section.
- Address 68,69,79,71,72,73: Basic information of the instrument, and the value is defined in a 16-precimal manner.

7. Information register group (20 addresses from 0x003C~0x004F)

The information register contains the instrument running status and information, such as the version number, serial number, etc., and is read using the function code 0x03. You can also use the function code 0x06 to modify the instrument operating status related register value, and control the instrument for electrode calibration and other operations.

register	address hexadecimal	address decimal system	name	type	attribute	remarks
keep register FC 0x 03 fetch FC 0x06 write in	0x 003C~0x	60~63				
	0x 0040	64	work pattern	integer	R/W	
	0x 0041	65	Working mode	integer	R/W	
	0x 0042	66	Work events	integer	R	
	0x 0043	67	Calibration status	integer	R/W	See also this chapter.8
	0x 0044	68	Instrument type	integer	R	
	0x 0045	69	Instrument model	integer	R	
	0x 0046	70	software release	integer	R	
	0x 0047	71	Hardware version	integer	R	
	0x 0048	72	serial number	integer	R	
0x 0049	73	serial number	integer	R		
0x 004A~0x	74~79					

□ Address 64: working mode, the register value reflects the current instrument working mode, the corresponding value of the working mode is written into the register to control the instrument into the corresponding mode, the corresponding relationship is as follows, the value is defined in 16 decimal mode.

0x0010: Measurement mode

0x0020: Information mode






0x0030: Browse mode

0x0050: Set the mode

0x0060: Calibration mode

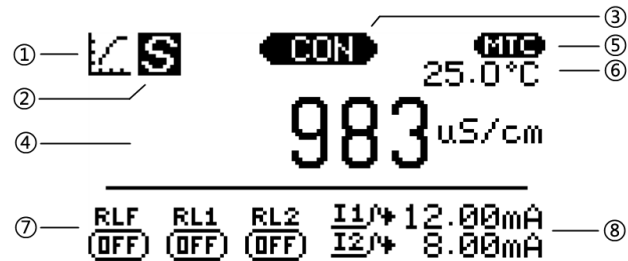
□ Address 65: Working mode parameters, used for some operations in instrument control, see specific applications. Generally, keys can be replaced, and the corresponding relationship

7、Key instructions

key	Key function description
	Press this key to enter browse mode to browse the relevant values In browse mode until you return to measurement mode Press this key to return key in another mode
	Press this key in the measurement mode to enter the calibration mode Press the button to move the option up when the menu interface has ▲ symbols This key is a up key when the value is set
	Press this key in measurement mode to enter the Settings menu Press the button to move the option down when the menu interface has ▼ symbols This key is a value down key when the value is set
	In the measurement mode, this key enters the information mode. Continue to press it to view the set parameters and instrument information Press this key▶ switch to the next menu This key is a value shift key when the value is set
	Press this key in measurement mode to display the device status area of the interface to switch between the relay state and the current state. Press this key in browsing mode to lock the current browsing interface (prevent browsing timeout from returning to measurement automatically) Press this key in other modes to confirm it

8、 measurement pattern

After the instrument is started, enter the measurement mode and display the main measurement parameters and instrument status. The interface is shown in the figure below.



- ① Working mode indication, measurement mode.
- ② Main measurement value stability symbol that appears indicating that the primary measurement value is stable.
- ③ Primary measurement value type. CON: conductivity. TDS: Total solid dissolution amount. SAL: salinity
- ④ Main measurement value display area. If OVER shows the upper limit, UNDER shows the measurement beyond the lower limit.
- ⑤ Type of temperature measurement value. MTC: Manual temperature compensation. ATC: Automatic temperature compensation.
- ⑥ Temperature measurement value display area. If OVER shows the upper limit, UNDER shows the measurement beyond the lower limit.
- ⑦ Relay status zone.
RLF: Functional relay status, ON: closed. OFF: break.
RL1: relay 1 status, ON: closed. OFF: break.
RL2: relay 1 status, ON: closed. OFF: break.
- ⑧ Transmission current channel output current value.
I1: Transmission current channel 1 output current value.
I2: Transmission current channel 2 output current value.

□ Address 88,89: Relay 2 on and off value.

When reading and write the values of their corresponding registers, the above four devices should write in an integer format, and judge the multiple relationship between the read and write value and the actual value, as well as the allowable range and the minimum interval, according to the measurement range of the device correlation value. Follow the steps in the following example to convert.

For example, the current measured conductivity range is 400.0mS/cm and wants to write a value of 12880uS / cm.

Step 1, unit unity. Converts the write value units to the units of the current measurement range. The same word is the 12.880mS/cm.

In Step 2, the decimal number is consistent. The same decimal place as the measurement range (rounded), 12.9mS/cm.

Step 3, take the whole type. Just noring decimal points and units. The integer value is obtained at 129.

When reading the above register, the resulting integer value plus the same decimal point and unit as the current measurement range value, you can obtain the actual value.

For example, the current measurement range is 4.000uS / cm, and the reading to the integer value of 1234 is 1.234uS / cm.

□ Address 84,85: Two parameters of the functional relay. The value of the register is the integer, when the parameter 1 value is 0, the functional relay is the alarm mode. When the value of the parameter 1 is 1When ~1000, the function relay is in the cleaning mode, and the value of the parameter 1 is in the cleaning interval time, as measured in hours. The value of parameter 2 is in wash mode, indicating the wash duration, range1~1000, per seconds.

6. Control transmitter register group (20 addresses from 0x0050~0x0063)

The relay switch value and the transmission current corresponding value set by the control transmission register for the user are read using the function code 0x03. When the instrument is in the setting menu interface (setting state), you must use the function code, 0x10, to write the values of two registers of one device at a time. For example, the closed and disconnected value of a relay. Of course, they are also continuous in the address. The address list is as follows. The property bar R is readable, W is Writable, and D is restored. This register is restored to the default value. Default reference 11.6, set the menu options default value list.

register	address hexadecimal	address decimal system	name	type	attribute	remarks
control Change to send register FC 0x 03 fetch FC 0x 10 write in	0x 0050	80	4~Corresponding value to 1	integer	R/W/D	Function code 0x 10 is written together
	0x 0051	81	4~The corresponding value of 1 20mA for the 20 m A channel	integer	R/W/D	
	0x 0052	82	4~Corresponding value to 2	integer	R/W/D	Function code 0x 10 is written together
	0x 0053	83	4~2 20mA for channel 20 m A	integer	R/W/D	
	0x 0054	84	Functional relay parameter 1	integer	R/W/D	Function code 0x 10 is written together
	0x 0055	85	Functional relay parameter 2	integer	R/W/D	
	0x 0056	86	Relay 1-on value	integer	R/W/D	Function code 0x 10 is written together
	0x 0057	87	Relay 1-off value	integer	R/W/D	
	0x 0058	88	Relay 2-on value	integer	R/W/D	Function code 0x 10 is written together
0x 0059	89	Relay 2-off value	integer	R/W/D		
	0x 005A~0x	90~99				

- Address: 80,81:4~Corresponding values for the 20mA lanes 1,4mA and 20mA.
- Address: 82,83:4~20mA lanes 2,4mA 20mA and 20 m A.
- Address 86,87: relay 1 on value and off value。

9、 Browse mode

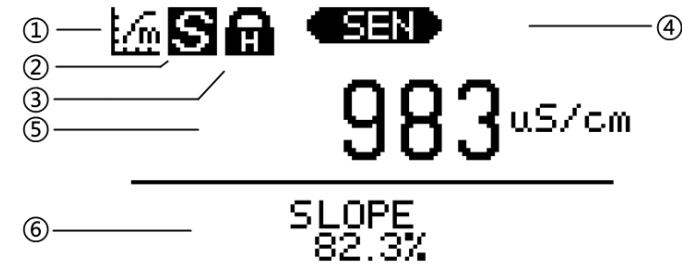


In the measurement mode, press the key to enter the browsing mode. If

there are multiple browsing pages, continue to browse in turn until the measurement mode is returned. The browsing mode mainly displays the electrode signals and calibration parameters, as a supplement to the main display interface. One minute without a button operation will automatically return to the measurement mode. If it needs a long time to view, you can lock the current interface, and then the key can exit the lock. The interface is shown



below.



- ① Working mode indication, browse mode.
- ② The main display area measures the stability symbol, which indicates that the value value is stable.
- ③ Interface lock symbol, press ENT to lock the current interface to prevent automatic return to measurement mode without operation.
- ④ Main display area measurement value type. SEN: Electrode signal.
- ⑤ Main display area measurements. If OVER shows the upper limit, UNDER shows the measurement beyond the lower limit.
- ⑥ Electrode calibration information display area. SLOPE: Slope. There are values indicating that the corresponding point has been successfully calibrated. Wave lines indicate no calibration or calibration failure.

10、 Calibration mode

1. Enter the calibration menu



In measurement mode, enter the electrode calibration menu and enter the

calibration interface.

The last item in the calibration menu is clearing the calibration data, an option to clear the calibrated information.

The calibration menu interface for a long time without keys, the instrument will automatically return to the measurement mode.

2. Calibration interface description



The working mode indicator icon of the calibration interface is, see the measurement mode and browse mode icon for other indexes.

3. Electrode calibration instructions

① The electrode can calibrate a point of slope, and the standard fluid used should be within the current measurement range, and greater than 40 words. If, the current measurement range is 40.00mS/cm, then the standard liquid should be greater than 0.40mS / cm and less than 40mS / cm.

② Slope calibration was successful, and the meter calculated the electrode slope. In SLOPE, the allowable range is 50% to 200.0%.

③ Repeat the calibration slope, and a successful calibration cleans up all the previous calibration information, recalculates the SLOPE, and then uses the original calibration data.

4. Electrode calibration process

① Enter the calibration menu, put the electrode into the standard liquid, select the calibration slope option in the menu, and key enter the standard liquid value input

value of 65. The relationship between TDS measurements and CON measurements is, and $TDS = CON * TDS \text{ coefficient}$.

□ Address 40: SAL coefficient, The setting range is 0.20~0.80, default 0.60, this register is 100 x value,

For example, reading a register value of 60, means 0.60. To set a value to 0.65, write to a value of 65. The relationship between SAL measurements and CON measurements is, and $SAL = CON * SAL \text{ coefficient}$.

□ Address 45: Digital filtering, Set range 1~24, Default value of 12.

□ Address 46: Language, not affected by the restored factory operation.

0: English

1: Simplified Chinese

□ Address 47: Backlit mode.

0: Late shutdown (default)

1: Often bright

□ Address 48: TDS unit.

0: ppm and ppt (Default)

1: mg/L and g / L

□ Address 50~54: Correlation, indicating the current device-controlled object. The values of the register represent different objects, refer to the floating floating register address list, where the CON value is object 0, the TDS value is object 1, and so on.

For example, the address 51 register is 4~20mA channel2 Correlation, with a register value of 4, then channel2 The current value of 2 is controlled by the temperature value.

selected value. Setting this register instrument restores the factory settings and will restart.

- 0: Electrical conductivity (CON)
- 1: Total solid dissolution volume (TDS)
- 2: Salinity (SAL)

□ Address 35: Electrode constant (K), the meter supports the following four electrode constants, selected according to the electrode used.

Change the electrode constant, and the calibrated data is cleared.

- 0: K = 0.01
- 1: K = 0.1
- 2: K = 1 (Default value)
- 3: K = 10

□ Address 36: Measurement range, each electrode with a different constant, are corresponding to the low, medium and high three measurement ranges, respectively with 1,1

2,3 Three values are indicated. Select the appropriate range according to the actual situation of the tested fluid, refer to XI.4.4. Modify the measurement range, and the calibrated data is cleared.

- 1: Low range
- 2: Medium range (default value)
- 3: High range

□ Address 37: Temperature base, The setting range is 15.0~35.0°C, default 25.0°C. This register is of a ~ 10-fold value

A value, for example, reading to a register value of 150, is 15.0°C. To set a value of 30.0°C, write a value of 300.

□ Address 38: Temperature coefficient, The setting range is 0.00~10.00%, with a default of 2.00%, this register is 100 x


A value, for example, read to a register value of 200, is 2.00%. To set a value of 1.88%, write a value of 188.


□ Address 39: TDS coefficient, The setting range is 0.40~1.00, default 0.50, this register is 100 x value,

For example, reading to a register value of 50 means 0.50. To set a value to 0.65, write to a


interface. 


② Use the value setting key () to set the current standard liquid value in the standard liquid value input interface. After setting, press the key to enter the

calibration interface and start the calibration. 

③  The calibration process is fully automatic calibration. After waiting for the measurement value to stabilize, the instrument displays the measurement value stability symbol, and the SLOPE is calculated. If the result meets the requirements, the calibration is successful, otherwise the calibration failure is indicated. Success or not, will return to the calibration menu.

④ Calibration failure Check electrode performance or standard fluid according to the error prompt, and recaliate after excluding the problem. Successful calibration

can be pressed  The key returns the measurement.

 Note: When waiting for the measurement value to stabilize, if the user keys, the instrument jumps over the automatic stability judgment, and calculates the calibration result according to the current display value.

11、 Set the mode

1. Go to the Setup menu



Press the key in the measurement mode, if the instrument does not set the password, then directly enter the Settings menu; If the instrument sets the password, it will



enter the password input interface for use Value setting key () enter the password, and then button, the password is correct, enter the Settings menu, otherwise the password is wrong.

2. Set the menu key description

- ① The setting menu includes three main menus, which are system setting, parameter setting and operation setting. Under the main menu interface,



press Key, can switch between three main course rooms.



Press the key to return to the measurement mode.



Press the key to move the cursor in the menu.



press Key to enter the option of the cursor.

- ② After entering the option,



Press the key to return to the upper level.

If the current interface is the option selection interface, press the key to move

the cursor, press CAL SET ENT Key confirmation option.

If the current interface is a numerical setting interface, Use the value setting key

to set the value, and press CAL SET INFO ENT Keys confirm the value.

- Address 25: Calibration, register value 1 means electrode calibrated and 0 uncalibrated.
- Address 28: Electrode slope, electrode successful calibration slope, instrument calculation of electrode slope. The slope value defaults to 1 decimal place in percentage. For example, with a register value of 1001, the slope data is 100.1%
- Address 30: the local address during the communication, the set range is 1~247, and the default value is 1, which is not affected by the recovery of the factory operation.
- Address 31: the communication wave rate, the set range is 0~4, the register value and the communication wave rate correspond to as follows, not affected by the resumption of factory operation.

0:1200

1:2400

2:4800

3:9600 (Default value)

4:19200

- Address 32: temperature supplement type, the instrument has two types of temperature supplement, manual and automatic, where the automatic temperature supplement mode is PT1000, the corresponding relationship is as follows. The register setting affects the next address register 33 temperature supplement setting to 0 (manual) sets the register to 250 (25.0°C) and if 2 (automatic) to 0 (0.0°C).

0: Manual

2: Automatic PT1000 (the default value)

- Address 33: Temperature supplement setting value, when the temperature supplement type is manual, this register indicates the manual temperature value, when the temperature supplement type is automatic, this register indicates the temperature offset value. This register is a 10 x value, for example, reading a register value of 500 means 50.0°C. To set a value to -10.0°C, write the value of -100.

Manual temperature values are set up to -10.0~130.0°C, temperature offset value set to -10.0~10.0°C.

- Address 34: Measurement type, namely the instrument measurement interface display value, and the relay 1,2, and 4~20mA transmission current channel 1, are related to this

5. Keep register group (40 addresses from 0x0014~0x003B)

Hold the register for the user settings and the electrode calibration information. Read the register value using function code 0x03, write the register value with function code 0x06 (setting status) using the function code 0 x 06, the register must have a writable attribute to be allowed to write the value. The address list is as follows. The property bar R is readable, W is Writable, and D is restored. This register is restored to the default value.

register	address	address	name	type	attribut	remarks
	0x0014~0x0018	20~24				
	0x0019	25	Calibration	integer	R/D	
	0x001A~0x001B	26~27				
	0x001C	28	Electrode slope	integer	R/D	One decimal place, in a unit of%
	0x001D	29				
	0x001E	30	postal address	integer	R/W	See also eleven.5.1
	0x001F	31	Communication	integer	R/W	See also eleven.5.2
	0x0020	32	Temperature fill	integer	R/W/D	See also eleven.4.1
	0x0021	33	Temperature	integer	R/W/D	See also eleven.4.1
	0x0022	34	Type of	integer	R/W	See also eleven.4.2
	0x0023	35	The electrode	integer	R/W/D	See also eleven.4.3
	0x0024	36	measuring range	integer	R/W/D	See also eleven.4.4
	0x0025	37	Temperature	integer	R/W/D	See also eleven.4.5
	0x0026	38	temperature	integer	R/W/D	See also eleven.4.6
	0x0027	39	TDS coefficient	integer	R/W/D	See also eleven.4.7
	0x0028	40	SAL coefficient	integer	R/W/D	See also eleven.4.8
	0x0028~0x002C	40~44				
	0x002D	45	digital filtering	integer	R/W/D	See also eleven.3.3
	0x002E	46	language	integer	R/W	See also eleven.3.1
	0x002F	47	Backlit mode	integer	R/W/D	See also eleven.3.2
	0x0030	48	TDS unit	integer	R/W/D	See also eleven.4.7
	0x0031	49				
	0x0032	50	4~The 20mA	integer	R/W/D	See also eleven.5.5
	0x0033	51	4~The 20mA	integer	R/W/D	See also eleven.5.5
	0x0034	52	Functional relay	integer	R/W/D	See also eleven.5.3
	0x0035	53	Relay 1 correlation	integer	R/W/D	See also eleven.5.4
	0x0036	54	Relay 2 correlation	integer	R/W/D	See also eleven.5.4
	0x0037~0x003B	55~59				

3. System Settings menu options description

① language

The menu displays languages, optional in Chinese or English.

② Backlit mode

Delay closing: there is a key operation, the backlight is lit, one minute after the key operation, the backlight is extinguished.

Chang Liang: The backlight is always lit up.

③ digital filtering

Digital filtering using sliding weighted mean filtering, set range 1~24.

The larger the value setting, the more stable the data is, but the slower the response, which is suitable for large interference occasions.

④ Change the password

When the password is set to 0000, the measurement mode can press SET to directly enter the Settings menu.

The password is set to other values. The measurement mode presses the SET key to enter the password input interface. The password input is correct to enter the setting menu.

⑤ Restore factory

During the factory recovery operation, the instrument will clear the calibration information, restore some set parameters to the factory default value, and then restart the instrument.

4. Parameter settings menu options description

① temperature compensation

Manual: If the instrument is not connected to the PT1000 temperature resistance, select this option to continue setting the temperature value in accordance with the instrument prompts, to set the range from -10.0 to 130.0°C.

Automatic: If the instrument is connected to the PT1000 temperature resistance, you can choose this option, then the instrument prompts to set the temperature offset, do not adjust the value, directly press Confirm the key, where the offset is set to 0.0°C. In actual use, if the deviation between the instrument display temperature and the temperature of the measured object is large, for example, the instrument display temperature is 26.0°C, and the temperature of the measured object using a mercury thermometer is 30.0°C, you can enter again the temperature compensation option, select the automatic option, the instrument prompt to set the temperature offset, set the value to + 4.0°C, press Confirm key confirmation. The return to the measurement mode shows the temperature display value changing to 30.0°C, or the measurement value of 26.0°C plus the offset set value of 4.0°C. The offset value allows a set range of -10.0 to + 10.0°C.

② Type of measurement

Measurement type is the display value of the instrument measurement interface, the optional electrical conductivity (CON), the total solid dissolution volume (TDS), and the salinity (SAL) Choose a good After confirmation, the instrument will resume the factory setting and restart, running according to the set function.

③ The electrode constant

The meter can be adapted to 0.01, 0.1, 1, and 10 Four electrode constants, selected according to the electrodes used

4. Floating floating-point register group (with 20 addresses ranging from 0x0000~0x0013)

The floating floating point register is the floating point data of the measurement and transmission current values of the instrument. Access with function code 0x03, address list listed below. The property bar R is readable and W is writable.

One data in the table occupies two register addresses. When reading the data, two register addresses need to be read at a time to form one floating-point data.

register	address hexadecimal	address decimal system	name	scope	explain	attribute	remarks
float Floating point type register	0x0000	0	CON price	0~400000	Floating point type Bitus uS / cm	R	
	0x0001	1					
	0x0002	2	TDS price	The CON range is multiplied by the TDS coefficient	Floating point type Unit of ppm or mg/L	R	
	0x0003	3					
	0x0004	4	SAL	The CON range is multiplied by the SAL coefficient	Floating point type unit mg/L	R	
	0x0005	5					
	0x0006	6	signal value	0~450000	Floating point type Bitus uS / cm	R	
0x0007	7						
FC 0X03 fetch	0x0008	8	temperature scale ①	-10.0~130.0	Floating point type unit °C	R	Over the upper limit of 130.1 Over the lower limit of -10.1
	0x0009	9					
		10~13					
	0x000E	14	4~20mA channel 1 current value	4.00~20.00	Floating point type unit mA	R	Over-cap limit of 21.00 Over the lower limit of 3.70
	0x000F	15					
	0x0010	16	4~20mA channel 2 current value	4.00~20.00	Floating point type unit mA	R	Over-cap limit of 21.00 Over the lower limit of 3.70
	0x0011	17					

① When temperature compensation is set to automatic, this register is a temperature measurement and if set to manual, for the user.

register	address hexadecimal	address decimal system	name	scope	type	attribute	remarks
float integer register FC 0X04 fetch	0x0000	0	CON price	0~4000	integer	R	Over limit 0X7FFF
	0x0001	1	The CON values are decimals and units		integer	R	
	0x0002	2	TDS price	0~4000	integer	R	Over limit 0X7FFF
	0x0003	3	TDS value decimals and units		integer	R	
	0x0004	4	SAL price	0~4000	integer	R	Over limit 0X7FFF
	0x0005	5	SAL values for decimals and units		integer	R	
	0x0006	6	signal value	0~4500	integer	R	Over limit 0X7FFF
	0x0007	7	Signal value decimal and units		integer	R	
	0x0008	8	temperature scale ①	-100~1300	integer	R	Over limit 0X7FFF Over the lower limit of 0X8000
	0x0009	9	Temperature value decimal and unit		integer	R	
	0x000E	14	Channel 1 current value	400~2000	integer	R	Over the limit 2100 Ultra-lower limit 370
	0x000F	15	Current value decimal and unit		integer	R	
	0x0010	16	Channel 2 current value	400~2000	integer	R	Over the limit 2100 Ultra-lower limit 370
	0x0011	17	Current value decimal and unit		integer	R	
0x0012	18	Relay status ②		integer	R	binary bit	
0x0013	19						

① When temperature compensation is set to automatic, this register is a temperature measurement and if set to manual, for the user.

② The relay status register indicates the relay status in binary mode, the register value is a 16-bit integer type, and the 0th digit is BIT0 indicates the functional relay status, BIT1 indicates the relay 1 status, and BIT2 indicates the relay 2 status. The value is 1, the relay is on, 0, the relay is off. As shown in the table below.

The 16-digit type	BIT15~BIT 3	BIT2	BIT1	BIT0
Relay status	Unused	Relay 2	Relay 1	Functional relays

④ measuring range

The electrodes of each constant correspond to low, medium, selected according to the table below.

The electrode constant	low range	Medium range	high range
0.01	0.000~4.000 uS/cm	0.00~40.00 uS/cm	0.0~400.0 uS/cm
0.1	0.00~40.00 uS/cm	0.0~400.0 uS/cm	0~4000 uS/cm
1	0.0~400.0 uS/cm	0~4000 uS/cm	0.00~40.00 mS/cm
10	0~4000 uS/cm	0.00~40.00 mS/cm	0.0~400.0 mS/cm

⑤ Temperature benchmark

The temperature reference set range is 15.0~35.0°C, default 25.0°C.

⑥ temperature coefficient

The temperature coefficient is set range from 0.00 to 10.00% with default 2.00%.

⑦ TDS set up

In the TDS settings item, select the unit, ratio, or concentration of the TDS measurement value.

Ratio: ppm is one in a million, and ppt is one in a thousand.

Concentration: mg/L is mg per liter and g / L is g per liter.

After the unit is set, press OK to continue to set the conductivity and TDS direct conversion coefficient.

The conversion coefficient is set range from 0.40 to 1.00 with default 0.50.

The conversion relationship is the TDS value = CON value * conversion coefficient.

Note: If you need to test the TDS, the measurement type should be set to the TDS first, and then other related items should be set after the instrument restart. Otherwise, the change of the measurement type will restore the other items to the default value.

⑧ SAL coefficient

The SAL conversion coefficient is set from 0.20 to 0.80 with default 0.60.

The conversion relationship is the SAL value = CON value * conversion coefficient.

Note: If you need to test the SAL, the measurement type should be set to the SAL first,

and then set the other related items after the instrument restart. Otherwise, the change of the measurement type will restore the other items to the default value.

Next-bit computer reply format

From the	FC	Modify the address of the	The number of modified	CRC
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes

④ Error response, the lower bit machine receives an error instruction, and will reply in the following format.

From the machine	Function code: + 0x80	error code	CRC verification
1 Bytes	1 Bytes	1 Bytes	2 Bytes

⑤ Error code description:

0x01: Function code error, received an unsupported function code.

0x02: Error in register address, incorrect in register address to be accessed.

0x03: Wrong number of registers, the number of registers to access is out of range.

0x04: The wrong modified value exceeds the allowable range of the register value.

0x05: Check error, and the CRC check value is in error.

0x06: Write error, the target register does not support write operation.

3. Floating whole register set (20 addresses ranging from 0x0000~0x0013)

The floating integer register is the integer data of the measurement value and the transmission current value of the instrument. Access with function code 0x04, the address list. The property bar R is readable and W is writable.

A measurement in the table consists of two parts, part and decimal and part.

For example, the address 0x0000 register is the integer form of CON value, the address 0x0001 register is the decimal number and unit of CON value, where the high byte value is used to represent the decimal number, the low byte value represents the unit, obtained by the query unit control table. If the read 0x0000 register value is 0x02BC (decimal 700), 0x0001 register value is 0x0107, where 01 means 1 decimal place and 07 means unit of uS / cm, the current CON value is 70.0uS/cm

negative numbers in a complement form, or 0xFFFF for -1.

- ① Function codes 0x03 and 0x04, read the register content, and have the same instruction format, which are suitable for different register groups.

Upper-computer instruction format

From the	FC	The starting address of the	N number of read registers	CRC
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes

Next-bit computer reply format

From the	FC	Returns the total number of	The N register data	CRC
1 Bytes	1 Bytes	1 Bytes	N * 2 bytes	2 Bytes

- ② The function code, 0x06 modifies a register value.

Upper-computer instruction format

From the	FC	Modify the address of the	modified value	CRC
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes

Next-bit computer reply format

From the	FC	Modify the address of the	The modified value	CRC
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes

- ③ The function code 0x10 modifies multiple consecutive register values, and the instrument can only be used to modify two consecutive register values, and only a few fixed registers can be modified.

Upper computer command format, here to modify two registers as an example, N=2 in the following table.

slave address	FC	revise The register of start address	revise The register of Number of N	modified value Bytes occupied by N * 2	first register modified value	the second register modified value	CRC verifica tion
1 Bytes	1 Bytes	2 Bytes	2 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes

5. Run the settings menu options description

- ① postal address
Native address during the RS485 MODBUS communication. Set the range of 1~247.
- ② Communication波特率
RS485 MODBUS communication rate, optional 1200,2400,4800,9600,19200.
- ③ Functional relays
The functional relay can be set to the alarm mode or to the cleaning mode.
Alarm mode: suitable for external alarm device, relay 1 and relay 2 are closed, the functional relay is closed.
Cleaning mode: suitable for external cleaning equipment, first set the cleaning interval, set the range of 1~1000 hours, and then set the cleaning duration, set the range of 1~1000 seconds.
- ④ Relay 1 and relay 2
The relevance of the relay is that the relay switch action is controlled at a value, determined by the measurement type of the current instrument. Set a closed value (ON), and then set an off value (OFF). Both values have the same measurement range of their controlled value, and both values cannot be the same.
- ⑤ 4~20mA channel
4~20mA channel 1The correlation of i. eThe output current value is controlled atA value (varying linearly with this value) is determined by the type of measurement of the current instrument. Channel 2 is then temperature-dependent.
Set the corresponding value of 4mA, and then set the corresponding value of 20mA. The setting range of the two values is the same as the measurement range of the controlled value, and the minimum interval between the two values is 200 words, specifically as follows:
Channel 1 is controlled by conductivity. with the current measurement range of 4000uS, the minimum interval is 200uS.
Channel 2 is controlled by temperature and the set minimum interval is 20.0℃。

6. Set the menu options default value list

In the table, if the value of the option that is affected by the recovery factory operation is Yes, then the recovery factory operation is performed, and this option becomes the default value. For otherwise it won't change.

menu	option	Windows default	Whether to recover Impact of factory operation
System Settings	language	the Chinese language	deny
	Backlit mode	Delayed closure	yes
	digital filtering	12	yes
	Change the	0000 (no password)	deny
parameter settings	temperature	Automatic temperature compensation, with	yes
	Type of	CON	deny
	The electrode	1	yes
	measuring range	Medium range 0~4000 uS/cm	yes
	Temperature	25°C.0	yes
	temperature	2.00%	yes
	TDS unit	ppm/ppt	yes
	TDS coefficient	0.50	yes
	SAL coefficient	0.60	yes
Run Settings	postal address	1	deny
	Communication	9600	deny
	Functional relays	Cleaning function with 1 hour interval for	yes
	Relay 1	The opening value is 0uS/cm The turn-off value is 4,000uS/cm	yes
	Relay 2	The opening value is 0uS/cm The turn-off value is 4,000uS/cm	yes
	4~20mA channel 1	4mA corresponds to a value of 0uS/cm The 20mA corresponds to a value of 4000uS/cm	yes
	4~20mA channel 2	The 4mA corresponding value is-10.0°C The corresponding value of 20mA is 130.0°C	yes

12、informative pattern



In the measurement mode, press the key to enter the information mode. In the information mode, you can browse the instrument setting parameter value and the instrument information. There are the current page and the total page number prompts on the upper right side of the display interface, such as 1 / 9, namely the current first page, with

a total of 9 pages, and there is Symbol prompt can bepress Key to turn the page to browse around.



The key can return to the measurement mode. If there is no key operation for a long time, the instrument automatically returns to the measurement mode.

13、communicating protocol

1. Newsletter profile

The instrument adopts the RS485 hardware interface Modbus-RTU communication protocol. Data format N, 8,1, that is, no parity, data 8 bits, stop 1 bit 1. The factory default native address is 1, with a port rate of 9600. The address can be set range 1~247, the port rate is optional 1200,2400,4800,9600,19200, and users can set itself according to the demand.

2. data format

The function codes used in the communication include 0x 03,0x 04,0x 06 and 0x10. Here is only a brief introduction to the corresponding data frame format of the used function code. If you need to know more content, you can query the M odbus-RTU related information by yourself.

A single register in the data occupies two bytes.

The floating-point number is represented by two registers, namely 4 bytes.

The integer data is represented by a register, high byte before, low byte after, and