APURE Water Quality Analysis

Free Chlorine Digital Sensor

Operation Manual

Shanghai GL Environmental Technology Co., Ltd

Catalog

Warranty

Shanghai GL provides warranty service for the instruments produced by the company. For the specific warranty service time, please refer to the warranty card attached to the purchase, but it does not include damag e caused by improper use. And provide lifetime maintenance services. If you need repair, please contact the dealer or our company, and you can send it back after confirmation. When sending back, make sure that the in strument is well packaged to avoid damage during transportation. The se nsor is a consumable item and our company is not responsible for the wa rranty. Please refer to the electrode instruction manual for details.

1、User notice

Thank you for your support to Shanghai GL. Please read the instruction manual carefully before use to help you use our products correctly.
For additional information about this product, please visit our website www.glenvironment.com。

2、Product inspection

Open the package carefully and check whether the instrument is damaged or the accessories are complete. If any abnormality is found, please contact the dealer or our company immediately.
Under no circumstances should the meter be disassembled on its own. The company will no longer be responsible for the warranty if such actions are taken.

3、Product Brief

This product is a digital sensor that integrates electronic circuits and microprocessors inside the sensor, referred to as digital electrodes, and has the following characteristics

1. RS-485 transmission interface, MODBUS-RTU communication protocol, duplex communication
2. Power and output isolation design to ensure electrical safety.
3. Built-in protection circuit to enhance anti-interference ability to adapt to complex environment.
4. The communication protocol is simple and easy to use, can output more electrode diagnostic information, and is more intelligent.
5. Low power consumption design to cope with more usage occasions, internal memory can save calibration and setting information in case of power failure.

4、Technical Parameters

Residual chlorine	Measuring range	00.00mg/L～20.00 mg/L
	Resolution	0.01 mg/L
	Accuracy	±3% FULL SCALE
Temperature	Measuring range	－10.0～110.0℃
	Resolution	0.1℃
	Accuracy	±0.5℃
	Temperature type	TH10K
	Temperature compensation	Automatic / Manual
Data transmission	RS-485	MODBUS-RTU Protocol
Other parameters	Working power	9~27VDC
	Isolation strength	2500Vrms
	Power	About 0.5W
	Product material	POM case
	Installation method	PG13.5 Thread

5、Wiring instructions

	Colour	Function Description
Data transmission	Green	RS-485 T/R+ (A)
	White	RS-485 T/R－ (B)
Power supply	Red	DC power supply +
	Black	DC power supply —

6、Protocol

The instrument adopts RS-485 Modbus communication protocol RTU mode, the serial port parameter is (N, 8, 1), that is, no check, 8-bit data, 1 stop bit, the default baud rate is 9600 (can be modified), address 01 (Can be modified).

6.1 Protocol Description

a) In this agreement, the letter "H" after the data indicates that the data is a hexadecimal number.
b) All registers are double-bytes, with the high byte first and the low byte second. Integer negative numbers are represented by two's complement, ie -1 is represented by FFFFH and -2 is represented by FFFEH.
c) The length of the upper computer command received by the instrument is 8 bytes, the excess part is invalid, but the first 8 bytes command is still valid. If there is a pause of 0.1 seconds, instructions that do not reach 8 bytes are considered invalid.
d) For CRC check, please refer to the CRC worksheet. When sending, the high byte is first and the low byte is next. When the verification code is 2A2AH, the instrument passes directly without verification.

6.2 Register overview

The instrument register is divided into three categories: floating register, parameter register and information register

a) The floating register data is the real-time measurement data of the instrument, such as residual chlorine value, temperature value, etc., a total of 20 register addresses, 0000H ~ 0013H (decimal 0 ~ 19), the function code 03 or 04 can be used to read data.

When the function code 04 is used to read the data, the measurement data returned by the meter is an integer. A data consists of two parts, the first part is the data numeric integer type, occupying a register, the second part is the data decimal places and units, sharing a register, each occupying one byte, the unit code see the unit code table.

When accessed with function code 03, the measurement data returned by the instrument is floating point, and one data occupies two registers (4 bytes in total) to represent floating point data.

b) The parameter register contains the calibration status of the instrument and some parameters that can be set by the user. A total of 40 register addresses, 0014H ～ 003BH (decimal 20 ~ 59), use the function code 03 to read the register data, use the function code 06 to write Registers, such as modifying the communication baud rate, instrument ID, etc.

c) The information register contains the running status of the instrument and the basic information of the instrument, such as the instrument serial number, model, etc., a total of 20 register addresses, 003CH ~ 004FH (decimal 60 ~ 79), use function code 03 to read register data, use function code 06 Write a register with writable attributes, used to control the operation of the instrument, such as the calibration operation of the instrument.

d) The addresses of the three types of registers are arranged consecutively, but when the function code 03 is used to read the register data, the number of registers read by one instruction cannot exceed the type of the current register.

6.3 Read floating register data instruction format Function code 03 or 04

HOST SEND	LOWER ADDRESS	FUNCTION	ADDRESS RANGE	Number of read registers N	CRC
	01H~F7H	03 OR 04	0000H~0013H	1~20	CRC H CRC L
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

LOWER REPLY	LOWER ADDRESS	FUNCTION	Bytes	Data of N registers	CRC
	01H~F7H	03or04	N*2	Data	CRC H CRC L
	1 byte	1 byte	1 byte	N*2 bytes	2 bytes

Example of reading floating register floating-point data instruction:（Send and reply data in hexadecimal format）

example: Read 10 floating registers and 5 floating point data from address 0000H

Host computer sends: **01 03 00 00 00 0A C5 CD**

Lower computer reply: **01 03 14 E7 2F 41 1F DA 2A 41 1F DA 2A 41 9F 00 00 00 00 75 26 41 C7 5E CC**

Send Interpretation:

Host send	**01**	**03**	**0000**	**000A**	**C5CD**
Decimal	1	3	0	10	
Interpretation	Device with ID address 1	Read floating point data	Start at address 0000H	Read 10 registers	CRC

Interpretation of response: （See floating register address table）

Lower reply	**01**	**03**	**14**
Decimal	1	3	20
Interpretation	Device with ID address 1	Response register Floating-point data read instruction	10 registers 20 bytes in length

Lower reply	**E72F**	**411F**	**DA2A**	**411F**

Address	0000H	0001H	0002H	0003H
Name	Residual chlorine		Hypochlorous acid	
Floating point	9.993941		9.990763	
Interpretation	Residual chlorine：9.99mg/L		Hypochlorous acid：9.99mg/L	

Lower reply	**DA2A**	**419F**	**0000**	**0000**
Address	0004H	0005H	0006H	0007H
Name	Electrode signal			
Floating point	19.981525			
Interpretation	Electrode signal ： 19.98mV		NC	

Lower reply	**7526**	**41C7**	**5ECC**
Address	0008H	0009H	
Name	Temperature		
Floating point	24.932201		
Interpretation	Temperature ： 24.9℃		CRC

Examples of instructions for reading floating register integer data：（Send and reply data in hexadecimal format）

example：Read 10 floating register integer data from address 0000H

Host computer sends：**01 04 00 00 00 0A 70 0D**

Lower computer reply：**01 04 14 03 E6 02 0E 03 E6 02 0E 07 CB**

02 00 00 00 00 00 00 FA 01 0B F5 80

Send Interpretation：

Host send	**01**	**04**	**0000**	**000A**	**700D**
Decimal	1	4	0	10	
Interpretation	Device with address 1	Read floating register integer data	Start at 0000H	Read 10 registers	CRC

Interpretation of response： （See floating register address table）

Lower reply	**01**	**04**	**14**
Decimal			20
Interpretation	Device with address 1	Response floating register Integer data read instruction	10 registers 20 bytes in length

Lower reply	**03E6**	**020E**		**03E6**	**020E**	
Address	0000H	0001H		0002H	0003H	
Name	Residual chlorine	Residual chlorine		Hypochlorous acid	Hypochlorous acid	
		Decimal	UNIT		Decimal	UNIT
		02	0E		02	0E
Decimal	998			998		
Interpretation	Residual chlorine ： 9.98mg/L			Hypochlorous acid ： 9.98mg/L		

Lower reply	**07CB**	**0200**		**0000**	**0000**	
Address	0004H	0005H		0006H	0007H	
Name	Electrode signal	Electrode signal				
		Decimal	UNIT			
		02	00			
Decimal	1995					
Interpretation	Electrode signal ： 19.95mV			NC		

Lower reply	**00FA**	**010B**		**F580**
Address	0008H	0009H		
Name	Temperature	Temperature		
		Decimal	UNIT	
		01	0B	
Decimal	250			
Interpretation	Temperature ： 25.0℃			CRC

6.4 Reading parameter register data Function code 03

HOST SEND	Slave ID	FUNCTION	Address	Number of read registers N	CRC
	01H~F7H	03	00014H~003BH	1~40	CRC H CRC L
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

LOWER REPLY	Slave ID	FUNCTION	Bytes	Number of read registers N	CRC
	01H~F7H	03	N*2	Data	CRC H CRC L
	1 byte	1 byte	1 byte	N* 2 bytes	2 bytes

Example of reading parameter register data instruction：（Send and reply data in hexadecimal format）

example：Read 7 parameter registers from address 001EH

Host computer sends：**01 03 00 1E 00 07 64 0E**

Lower computer reply：**01 03 0E 00 01 00 03 00 01 00 00 00 00 00 01 01 90 BF 7C**

Send Interpretation：

HOST SEND	01	03	001E	0007	640E
Decimal	1	3	30	7	
Interpretation	Device with slave address 1	Read register data	Start at 001EH	Read 7 registers	CRC

Interpretation of response： （See parameter register address table）

Lower reply	01	03	0E
Decimal	1	3	14
Interpretation	Device with slave address 1	Respond to the parameter register data read command	7 registers 14 bytes in lengt

Lower reply	**0001**	**0003**	**0001**	**0000**
Address	001EH	001FH	0020H	0021H
Name	ID	BAUD RATE	Temperature compensation type	Temperature offset value Or manual temperature setting
Decimal	1	3	1	0
Interpretation	Device with slave address 1	3 correspond 9600 **Note1**	1correspond auto **Note1**	0 correspond 0.0℃ **Note2**

Lower reply	**0000**	**0001**	**0190**	**BF7C**
Address	0022H	0023H	0024H	
Name		PH Compensation switch 0：OFF 1： ON	PH Value	
Decimal		1	400	
Interpretation	NC	1 ON	pH Value 4.00pH	CRC

Note1 In the partial interpretation, the corresponding meanings of the data values only list the corresponding meanings of the current value. For the corresponding meanings of other values, please refer to the detailed description of the parameter register.

Note2 The temperature offset setting value or manual temperature setting value (0021H) register is determined by the temperature compensation type register (0020H). If the temperature compensation type is manual temperature compensation, this register is the manual temperature setting value. If the temperature compensation type is automatic temperature compensation, this register is the temperature offset setting value. This register is a 10-times value. For example, when 00FAH is read, it is converted to Decimal to 250, which means 25.0 ℃. To write 10.0 ℃ to the register, you need to write the hexadecimal value corresponding to 100 0064H.

6.5 Reading information register data Function code 03

HOST SEND	Slave ID	FUNCTION	Adress	Number of read registers N	CRC
	01H~F7H	03	0003CH~004FH	1~20	CRC H CRC L
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

LOWER REPLY	Slave ID	FUNCTION	bytes	Register data N	CRC
	01H~F7H	03	N*2	Data	CRC H CRC L
	1 byte	1 byte	1 byte	N * 2 bytes	2 bytes

Example of command to read data from information register：（Send and reply data in hexadecimal format）

example：Read 10 information registers from address 0040H

Host computer sends：**01 03 00 40 00 0A C4 19**

Lower computer reply：**01 03 14 00 10 00 00 00 00 00 00 00 08 12 10 01 00 01 01 12 34 AB CD 27 95**

Send Interpretation：

HOST SEND	**01**	**03**	**0040**	**000A**	**C419**
Decimal				10	
Interpretation	Device with slave address 1	Read register data	Start at 0040H	Read 10 registers	CRC

Interpretation of response： （See information register address table）

Lower reply	**01**	**03**	**14**
Decimal			20
Interpretation	Device with slave address 1	Response information register data read command	10 registers 20 bytes in length

Lower reply	**0010**	**0000**	**0000**	**0000**
Address	0040H	0041H	0042H	0043H
Name	Operating mode	Mode parameters 1	Work event	Status indicator
Interpretation	Currently in Measurement mode	NC	NC	NC

Lower reply	**0008**	**1210**	**0100**	**0101**
Address	0044H	0045H	0046H	0047H
Name	Equipment type	Device model	Software version	hardware version
Interpretation	Device model FCL1210		1.00	1.01

Lower reply	**1234**	**ABCD**	**2795**
Address	0048H	0049H	
Name	High serial number	Low serial number	
Interpretation	Device serial number 1234ABCD		CRC

6.6 Modify single parameter or information register data instruction format Function code 06

HOST SEND	Slave ID	FUNCTION	Register address to be modified	Modify value	CRC
	01H~F7H	06	The address of a register with writable properties in the register	Data	CRC H CRC L
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

LOWER REPLY	Slave ID	FUNCTION	Modified register address	Modify value	CRC
	01H~F7H	06	Address	Data	CRC H CRC L
	1 byte	1 byte	2 bytes	2 bytes	2 bytes

Examples of instructions for modifying individual parameters or information registers：（The data is in hexadecimal）

example1：Set the compensation switch (register 0023H) to off

Host computer sends：**01 06 00 23 00 00 78 00**

Lower computer reply：**01 06 00 23 00 00 78 00**

Send Interpretation：

Host send	**01**	**06**	**0023**	**0000**	**7800**
Decimal					
Interpretation	Device with slave address 1	Modify register data instruction	Compensation switch	0 is OFF	CRC

Interpretation of response：

Lower reply	**01**	**06**	**0023**	**0000**	**7800**
Decimal					
Interpretation	Device with slave address 1	Reply register data command	Compensation switch	0 is OFF	CRC

example 2：Temperature offset（register 0021H）Set as -5.0℃

Host computer sends：**01 06 00 21 FF CE 19 A4**

Lower computer reply：**01 06 00 21 FF CE 19 A4**

Send Interpretation：

Host send	**01**	**06**	**0021**	**FFCE**	**19A4**
Decimal				-50	
Interpretation	Device with slave address 1	Modify register data instruction	Temperature offset register address	Modify the value to -5.0℃	CRC

Interpretation of response：

Lower reply	**01**	**06**	**0021**	**FFCE**	**19A4**
Decimal				-50	
Interpretation	Device with slave address 1	Reply register data command	Temperature offset register address	Modify the value to-5.0℃	CRC

6.7 Error command response format

LOWER REPLY	Slave ID	FUNCTION	Error code	CRC
	01H~F7H	Command function code received +80H	See the protocol description for error codes	CRC H CRC L
	1 byte	1 byte	1 byte	2 bytes

Function code：When the instrument receives an error command, it will add 80H to the received function code as the function code of the response data frame. If the upper computer uses 03 function code to access, and the lower computer responds with the function code of 83H, it means that the upper computer The instruction is wrong, you need to check the error code for the specific error.

error code：

01：The function code is wrong. This protocol only supports function code 03, 04, 06 access. When the function code is other values, this error code is returned.

02：The register address is wrong. When the register address accessible by the function code exceeds the corresponding allowable range, this error code is returned.

03：The number of registers is wrong. The number of registers to be read exceeds the range of subsequent registers of the current type. This error code is returned.

04：The modified value is wrong. The data of the register to be modified exceeds the value range of this register data. This error code is returned.

05：CRC error, check result does not match, return this error code.

06：Write error, the write (modify) operation is performed on the read-only register, that is, the function code 06 is used to access the read-only register, and this error code is returned.

6.8 Floating register address（integer data）

Address	Name	Data	High byte	Low byte	R/W	Remarks
0000H	Residual chlorine	0.00mg/L	16-bit integer data 0~2000		R	0x7FFF
		~				Over
		20.00mg/L				0x8000
0001H	Decimal and unit		Decimal	Unit	R	Under
0002H	Hypochlorous acid	0.00mg/L	16-bit integer data 0~2000		R	0x7FFF
		~				Over
		20.00mg/L				0x8000
0003H	Decimal and unit		Decimal	Unit	R	Under
0004H	Sensor signal	-10.00mV	16-bit integer data -1000~4000		R	0x7FFF
		~				Over
		40.00mV				0x8000
0005H	Decimal and unit		Decimal	Unit	R	Under
0006H						
0007H						
0008H	Temperature value	-10.0℃	16-bit integer data -100~1100		R	0x7FFF
		~				Over
		110.0℃				0x8000
0009H	Decimal and unit		Decimal	Unit	R	Under

6.9 Floating register address（Floating point）

Address	Name	Date	Type of data	R/W	Note
0000H 0001H	Residual chlorine	0.00mg/L ~ 20.00mg/L	Floating point data UNIT mg/L	R	
0002H 0003H	Hypochlorous acid	0.00mg/L ~ 20.00mg/L	Floating point data UNIT mg/L	R	
0004H 0005H	Electrode signal	-10.00mV ~ 40.00mV	Floating point data UNIT mV	R	
0006H 0007H					
0008H 0009H	Temperature	-10.0℃ ~ 110.0℃	Floating point UNIT ℃	R	110.1 Over -10.1℃ Under

6.10 Parameter register address

Read and write recovery attributes, R means readable, W means writeable, D means perform factory reset operation. This register will be rewritten to the default value, and without D means this register is not affected by the factory reset operation.

Address	Name	Data	Data analysis	R/W/D	Default
0019H	FCL Calibration situation **Note4**	0：Not calibrated 1：Calibrated	BIT0：ZERO BIT1：SLOPE	R/D	Not calibrated
001AH	SENSOR OFFSET	-0.30mg/L～0.30mg/L	16-bit integer data -30~30	R/D	0.00mg/L
001BH	SENSOR OFFSET DECIMAL AND UNIT	020EH	Decimal and unit mg/L	R/D	
001CH	SENSOR SLOPE	30.0%～ 300.00%	16-bit integer data 300~3000 Decimal and unit %	R/D	100.00%
001EH	ID	1~247	255(FFH) General address	R/W	1
001FH	Communication rate	0.833333333 1.708333333 3.416666667 6.791666667 4：19200		R/W	9600
0020H	Temperature compensation type	0：manual 1：auto	This register value determines the meaning of the next register	R/W/D	Auto
0021H	Temperature set value（manual）	-10.0℃~110.0℃	10 times value read 250 the actual value is 25.0℃ **Note5**	R/W/D	25.0℃
	Temperature offset value（auto）	-10.0℃~10.0℃			0.0℃

6.11 Information register address

Address	Name	data analysis	R/W	remarks
0040H	Operating mode	0010H:Measurement mode 0050H:Setting mode 0060H:Calibration mode	R/W	**Note 6**
0041H	Mode		R/W	See the introduction of working mode chapter
0042H	Event		R	
0043H	Calibration status		R/W	
0044H	Instrument type	0008H：FCL	R	
0045H	Model	1210H	R	BCD
0046H	Software version		R	BCD
0047H	hardware version		R	BCD
0048H	Serial number1		R	BCD
0049H	Serial number2		R	BCD

Note 6 When accessing the working mode register of the lower computer, the return value may not be 0 according to the last digit of hexadecimal. Press 0 to process. If the working mode register is read, the return value is 0011H, that is, 0010H, indicating that the meter is currently in the measurement mode.

6.12 Calibration of residual chlorine

The residual chlorine calibration can calibrate up to two points, namely the zero point and the slope point, which is represented by BIT0 and BIT1 in a 16-bit integer value binary, the corresponding relationship is shown in the following table

	Unused	Slope	Zero
16-bit integer	BIT15~BIT2	BIT1	BIT0

Read the calibration status register, the value corresponding to the position of the calibration point is 1, then this point has been successfully calibrated.

Since the electrode must first calibrate the slope point, the calibration status register value has the following three cases：

a) The value is 0000H, that is, BIT1 and BIT0 are all zero, no point calibration.

b) The value is 0002H, that is, BIT1 is 1, BIT0 is zero, the slope point has been calibrated.

c) The value is 0003H, that is, both BIT1 and BIT0 are 1, and both points have been calibrated.

6.13 Unit comparison table

DATA	00H	01H	02H	03H	04H	05H	06H
Unit	mV	nA	uA	mA	Ω	KΩ	MΩ
DATA	07H	08H	09H	0AH	0BH	0CH	0DH
Unit	uS	mS	S	pH	℃	℉	ug/L
DATA	0EH	0FH	10H	11H	12H	13H	14H
Unit	mg/L	g/L	ppb	ppm	ppt	%	mbar
DATA	15H	16H					
Unit	bar	mmHg					

7、Setting mode

Users can use the host computer to send commands through the RS485 interface to make the meter enter the setting mode. In the setting mode, the meter can be restored to the factory settings. The specific operation process is as follows：

a) Enter setting mode. Use the 06H function code to write a value (0050H) in the working mode register (address 0040H) to make the meter enter the setting mode.

   Host computer sends: 01 06 00 40 00 50 88 22

   Lower computer reply: 01 06 00 40 00 50 88 22

b) Write recovery instructions. After the meter enters the setting mode, use the 06H function code to write a value (7FFFH) in the mode parameter register (address 0041H). The meter will clear all calibration information and restore the temperature mode and temperature offset to the default value (automatic temperature compensation, Offset 0.0 ℃), and the parameter register that needs to be restored to the default value, and then restart.

   Host computer sends: 01 06 00 41 7F FF B9 AE

   Lower computer reply: 01 06 00 41 7F FF B9 AE

8、Calibration process

In order to ensure measurement accuracy and correctness, users need to use standard solutions to calibrate newly installed meters, or periodically calibrate meters in use. The calibration method of this instrument is to use the host computer to send commands through the RS485 interface to complete.

8.1 Calibration process

a) Put the meter into the standard solution.

b) Write the standard liquid value (slope point) or code (zero point) in the calibration status register (0043H).

c) Wait for the calibration to complete. You can check the calibration status by reading the value of the calibration status register (0043H). The corresponding situation of reading is as follows:：

0: calibrated successfully (returned to measurement mode).

1: Calibrating (still in calibration mode, please read the status later).

2：The correct standard value is not received within 180 seconds (the measurement mode has been returned).

3：The signal cannot be stabilized or exceeds the measurement range within 180 seconds (the measurement mode has been returned).

4：Sensor performance (slope or offset value) is outside the allowable range (returned to measurement mode).

d) To calibrate other points, repeat this process.

8.2 Calibration instructions

a) When calibrating the residual chlorine slope point, the standard liquid value is written into the calibration status register according to the shape. If the standard liquid is 5.00 mg / L, the hexadecimal value of 500 is written as 01F4H. When calibrating the zero point, write the zero code 0001H to the calibration status register.

b) The residual chlorine can be calibrated up to two points. For uncalibrated electrodes, the slope point must be calibrated first. Each time the slope point is calibrated, the meter will clear all calibration information.

c) After successfully calibrating the slope point, the meter will calculate the slope value of the sensor. After successfully calibrating the zero point, the meter will calculate the slope of the slope point and the zero point (which will be different from the slope of the calibrated slope point only) and the zero offset. You can view the sensor performance by reading registers such as calibration and electrode slope.

d) Write 7FFFH in the calibration status register (0043H), the meter will clear all calibration information.

8.3 Examples of calibration instructions

a) Calibration slope point, such as 5.00mg / L standard liquid value 01F4H written into calibration status register (0043H)

Send on computer: 01 06 00 43 01 F4 78 09

Lower camera response: 01 06 00 43 01 F4 78 09

b） Query calibration status, read status indicator register

Send on computer: 01 03 00 43 00 01 75 DE

Lower machine response: 01 03 02 00 00 B8 44

For the meaning of the value underlined in the response of the lower computer, please see the explanation in the calibration process.

c) After the calibration is completed, the device will return to the measurement state regardless of whether the calibration is successful or not. Pay attention to modify the codes of different standard solutions and recalculate the CRC. For specific instructions, please refer to the chapter of common instructions.

9、Common instructions

Take device address 01H as an example

9.1 Read register

Meaning	ID	Function	Read the first address of the register	Number of read registers	CRC
Read all floating registers Integer data	01	04	00 00	00 0A	70 0D
Read all floating registers Floating point data	01	03	00 00	00 0A	C5 CD
Read all parameter registers	01	03	00 19	00 0C	94 08
Readall in formation registers	01	03	00 40	00 0A	C4 19

9.2Modify register

Meaning	ID	Function	The address of the register to be modified	Modify value	CRC
Change the device address to 02	01	06	00 1E	00 02	68 0D
Modify the baud rate to 2400	01	06	00 1F	00 01	79 CC
Set the temperature compensation type to manual	01	06	00 20	00 00	88 00
Set the temperature compensation type to auto	01	06	00 20	00 01	49 C0
Modify temperature offset value to -5.0℃	01	06	00 21	FF CE	19 A4

Compensation off	01	06	00 23	00 00	78 00
Compensation on	01	06	00 23	00 01	B9 C0
Compensation value is set to 7.00pH	01	06	0024	02 BC	C9 10

9.3 reset （Need to execute the following two instructions）

Command meaning	ID	Function	The address of the register to be modified	Data	CRC
Put the device into setup mode	01	06	00 40	00 50	88 22
Send a factory reset command	01	06	00 41	7FFF	B9 AE

9.4 Electrode calibration

Command meaning	ID	Function	The address of the register to be modified	Data	CRC
Calibration slope point 1.00mg/L	01	06	00 43	00 64	79 F5
Calibration zero	01	06	00 43	00 01	B9 DE
Check the calibration status	01	03	00 43	00 01	75 DE