ATO

Water Quality Nitrate Ion Sensor

User Manual

ATO

Catalogue

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1. Notice to Users

Thank you for your support to our company. Please read the instruction manual in detail before using it, which will help you correctly use our products.

2. Product Inspection

Carefully open the package, check whether the instrument is damaged, accessories are complete, if you find any abnormal, please contact the dealer or our company immediately.

Under no circumstances shall the instrument be disassembled by oneself. If such behavior occurs, the company will not be responsible for the warranty.

3. Product Introduction

This product is a digital sensor that integrates electronic circuit and microprocessor into the sensor, known as digital electrode, with the following characteristics

1. RS-485 transmission interface, MODBUS-RTU communication protocol, two-way communication.
2. Power supply and output isolation design to ensure electrical safety.
3. Built-in protection circuit, enhance the ability to resist interference, in order to adapt to complex environment.
4. The communication protocol is simple and easy to use, can output more electrode diagnostic information, more intelligent.
5. The low-power design is designed for more use, and the internal memory can save calibration and setting information in the event of power failure.

6 PPS shell, strong corrosion resistance, 3/4, front and rear threads, easy to install.

4. Technical Parameters

ionic concentration	measuring range	0.5～62000ppm
	resolution ratio	0.01 ppm
	certainty of measurement	±5%FS
temperature	measuring range	-10.0～110.0℃
	resolution ratio	0.1℃
	certainty of measurement	±0.5℃
	Temperature type	Thermal resistance NTC10 K
	temperature compensation	Automatic/manual
data transmission	RS-485	MODBUS-RTU communication protocol
Other parameters	working power supply	9～27VDC
	Separation intensity	2500Vrms
	Product efficiency	About 0.5W
	Product material	PPS monoblock
	way to install	3/4 inch front and rear threads

5. Wiring Instructions

	pigment	function declaration
data transmission	Yellow line	RS-485 communication T/R+ (A)
	White line	RS-485 communication T/R- (B)
Power supply	Red line	The DC source is positive
	Black line	Direct current source location

The instrument adopts RS-485 Modbus communication protocol RTU mode, and the serial port parameter is (N, 8, 1), that is, no check, 8 bits
According to 1 stop bit, the default baud rate is 9600 (modifiable), and the address is 01 (modifiable).

1 Protocol Specification

a) In this agreement, the letter "H" is appended to the data to indicate that the data is a hexadecimal number.

b) All registers are double bytes, and the high byte is transmitted first and the low byte is transmitted later. The negative integer is represented by complement code, that is, -1 is represented by FFFFH, and-2 is represented by FFFEH.

c) The length of the upper computer instruction received by the instrument is all 8 bytes, and the part beyond is invalid, but the first 8 bytes of the instruction are still valid. If the pause is 0.1 seconds, the instruction not reaching 8 bytes is regarded as invalid.

d) For CRC verification, see CRC and worksheet. When sending, the high byte is in front and the low byte is at the back. When the check code is 2A2AH, the instrument passes directly without checking.

2 Overview of Registers

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

a) Floating register data is the real-time measurement data of the instrument, such as conductivity value, temperature value, etc., a total of 20 registers

Address, 0000H ~ 0013H (decimal 0 19), the data can be read by function code 03 or 04.

When using function code 04 to read data, the instrument returns measurement data as an integer. A single data entry consists of two parts: the first part is the integer value, which occupies one register; the second part includes the decimal places and unit, each occupying one byte and sharing one register. Refer to the unit code table for the unit codes.

When the function code 03 is used to access, the measurement data returned by the instrument is a floating point type, and one data occupies two registers (4 bytes in total) to represent a floating-point data, the data unit is the default value.

b) The parameter register contains the instrument's calibration status and user-set parameters, with a total of 40 register addresses ranging from 0014H to 003BH (decimal 20 to 59). Use function code 03 to read the register data, and use function code 06 to write to registers with writable attributes, such as modifying the communication baud rate or the instrument ID.

c) The information register contains the operational status and basic information of the instrument, such as the serial number and model. It consists of 20 register addresses, ranging from 003CH to 004FH (decimal 60 to 79). The function code 03 is used to read the register data, while the function code 06 is used to write to registers with writable attributes, which are used to control the instrument's operation, such as calibration operations.

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

3 Read Floating Register Data Instruction Format Function Code. 3 Or. 4

Upper computer instruction format	From the machine address	FC	Storage address range	Read the number of storage devices N	CRC
	~ 01H F7H	03 Or 04	~ 0000H 0013H	1~20	CRC is high and CRC is low
	1 byte	1 byte	2 byte	2 byte	2 byte

The lower machine should respond normally	From the machine address	FC	Number of bytes	Data from N registers	CRC
	~ 01H F7H	03 Or 04	N*2	data	CRC is high and CRC is low
	1 byte	1 byte	1 byte	N*2 bytes	2 byte

Example of floating register floating point data instruction: (Send and respond data in hexadecimal format) Example: Read 10 floating registers with a total of 5 floating point data from address 0000H

Send to the boarding position: 01 03__00__00___00__0A__C5__CD

Answer at the landing position: 01 03 14__00__00__41__20___33__33__42__C8__00__00__00__00__00__00__00__00___E3__E8__41__C7__43__0C

Send a message:

It is sent by the upper computer	01	03	0000	000A	C5CD
decimal system	1	3	0	10	
unscramble	A device with a machine address of 1	Read floating point data from a floating point storage device	Start at address 0000H	Read 10 registers	CRC verification

Answer interpretation: (See Table of Floating Storage Addresses)

The lower machine should respond	01	03	14
decimal system	1	3	20
unscramble	A device with a machine address of 1	Answer floating register floating point type data read instruction	10 Each register is 20 bytes long

The lower machine should respond	0000	4120	3333	42C8
Storage address	0000H	0001H	0002H	0003H
Storage name	The ion concentration value		Electrode signal value	
floating number	10. 00		100. 1	
unscramble	Ionic concentration value: 10.00 ppm		Electrode signal value: 100.1 mV	

The lower machine should respond	0000	0000	0000	0000
Storage address	0004H	0005H	0006H	0007H
Storage name				
floating number				
unscramble	insignificance		insignificance	

The lower machine should respond	E3E8	41C7	430C
Storage address	0008H	0009H	
Storage name	temperature scale		
floating number	24. 986282		
unscramble	Temperature value: 25.0℃		CRC verification

Example of reading floating register integer data instruction:(send and respond data are in hexadecimal format)

Example: Read 10 floating register integer data starting from address 0000H

Send the boarding position: 01 04__00__00___00__0A___70__0D

Answer at the landing position: 01 04 14__03__EB__02__11__03__EC__01__00__00__00__00__00__00__00__00

00 00 FA 01 0B C7 51

Send a message:

It is sent by the upper computer	01	04	0000	000A	700D
decimal system	1	4	0	10	
unscramble	A device with an address of 1	Read to fetch floating point, register integer data	From address 0000H begin	Read 10 registers	CRC verification

Interpretation of responses: (See floating register address table)

The lower machine should respond	01	04	14
decimal system			20
unscramble	A device with a machine address of 1	Answer the floating storage register type data read instruction	10 Each register is 20 bytes long

The lower machine should respond	03EB	0211		03EC	0100	
Storage address	0000H	0001H		0002H	0003H	
Storage name	The value of the ion concentration	The ion concentration value		Electrode signal value	Electrode signal value	
		decimal	unit		decimal	unit
		02	11		01	00
decimal system	1000			1001		
unscramble	Ionic concentration value: 10.00 ppm			Electrode signal value: 100.1 mV		

The lower machine should respond	0000	0000		0000	0000	
Storage address	0004H	0005H		0006H	0007H	
Storage name						
decimal system						
unscramble	insignificance			insignificance		

The lower machine should respond	00FA	010B		C751
Storage address	0008H	0009H		
Storage name	Temperature value number	temperature scale		
		decimal	unit	
		01	0B	
decimal system	250			
unscramble	Temperature value: 25.0℃			CRC verification

4 Read the Parameter Register Data Instruction Format Function Code. 3

Upper computer instruction format	From the machine address	FC	Storage address range	Read the number of storage devices N	CRC
	01H ~ F7H	03	00014H ~ 003BH	1 to 40	CRC is high and CRC is low
	1 byte	1 byte	2 byte	2 byte	2 byte

The lower machine should respond normally	From the machine address	FC	Number of bytes	Data from N registers	CRC
	01H ~ F7H	03	N * 2	data	CRC is high and CRC is low
	1 byte	1 byte	1 byte	N*2 bytes	2 byte

Example of reading parameter register data instruction:(send and respond data are in hexadecimal format)

Example: Read 7 parameter registers starting from address 001EH

Send to the boarding position: 01 03__00__1E___00__06__A5__CE

Answer at the landing position: 01 03 0C__00__01___00__03___00__01___00__00___00__00__ __00__01___52__7C

Send a message:

It is sent by the upper machine	01	03	001E	0006	A5CE
decimal system	1	3	30	6	
unscramble	A device with a machine address of 1	Read, write and store data	Start at address 001EH	Read six registers	CRC verification

Answer interpretation: (See table of parameter register addresses)

The lower machine should respond	01	03	0C
decimal system	1	3	12
unscramble	A device with a machine	Answer the parameter storage data	6 Each register is 12 bytes long

	address of 1	read command	

5 Read instruction format for information register data function code

The lower machine should respond	0001	0003	0001	0000
Storage address	001EH	001FH	0020H	0021H
Storage name	This machine address	traffic rate	Warm supplementary type	Temperature bias set value or manual temperature set value
decimal system	1	3	1	0
unscramble	The local address is 1	3 Corresponds to 9600 Note 1	1 Correspond to automatic temperature compensation Note 1	0 Indicates bias 0. 0℃ Note 2

The lower machine should respond	0000	0001	527C
Storage address	0022H	0023H	
Storage name	unused	ionic valency 0: No ion price 1: Monovalent ion 2: divalent ion	
decimal system	0	0	
unscramble		1 Corresponds to one price	CRC verification

Note 1 In the partial interpretation of the data value, only the meaning corresponding to the current value is listed. For the meaning corresponding to other values, please refer to the detailed description of the parameter register.

Note 2 The temperature bias setting or manual temperature setting (0021H) register is a temperature compensation type register (0020H)

If the temperature compensation type is manual, this register stores the manual temperature setting value. If the temperature compensation type is automatic, this register stores the temperature bias setting value. This register is set to 10 times the value; for example, if it reads 00FAH, this translates to a decimal value of 250, representing 25.0℃. To write 10.0℃ into the register, you need to write the hexadecimal value 0064H, which corresponds to 100.

Upper computer instruction format	From the machine address	FC	Storage address range	Read the number of registers N	CRC
	01H ~ F7H	03	0003CH ~ 004FH	1 to 20	CRC is high and CRC is low
	1 byte	1 byte	2 byte	2 byte	2 byte

The lower machine should respond normally	From the machine address	FC	Number of bytes	Data from N registers	CRC
	01H ~ F7H	03	N*2	data	CRC is high and CRC is low
	1 byte	1 byte	1 byte	N*2 bytes	2 byte

Example of reading information register data instruction:(send and respond data in hexadecimal format)

Example: Read 10 information registers starting from address 0040H

Departure from the boarding position: 01 03__00__40___00__0A__C4__19

Answer at the landing position: 01 03 14__00__10__00__00__00__00__00__00__00__10__12__10__01__00__01

01 12 34 AB CD 59 35

Send out the interpretation:

It is sent by the upper machine	01	03	0040	000A	C419
decimal system				10	
unscramble	A device with a machine address of 1	Read, write and store data	Start at address 0040H	Read 10 registers	CRC verification

Interpretation of responses: (See information register address table)

The lower machine should respond	01	03	14
decimal system			20
unscramble	A device with a machine address of 1	Answer the information storage register data read command	10 Each register is 20 bytes long

The lower machine should respond	0010	0000	0000	0000
Storage address	0040H	0041H	0042H	0043H
Storage name	work pattern	Mode parameter 1	Work events	Status indicator
unscramble	It is in measurement mode	This has no meaning	This has no meaning	This has no meaning

The lower machine should respond	0010	1210	0100	0101
Storage address	0044H	0045H	0046H	0047H
Storage name	device type	unit type	software release	Hardware version
unscramble	Equipment model ION1210		1.00	1.01

The lower machine should respond	1234	ABCD	5935
Storage address	0048H	0049H	
Storage name	Column number is high	Column number is low	
unscramble	Equipment serial number 12 3 4 ABCD		CRC verification

6 Modify a single parameter or information storage register data instruction format function code. 6

Upper computer instruction format	From the machine address	FC	The storage address to be modified	modified value	CRC
	01H ~ F7H	06	The address of a writable register	data	CRC is high and CRC is low
	1 byte	1 byte	2 byte	2 byte	2 byte

The lower machine should respond normally	From the machine address	FC	The revised storage address	The value has been modified	CRC
	01H ~ F7H	06	Storage address	data	CRC is high and CRC is low
	1 byte	1 byte	2 byte	2 byte	2 byte

Example of modifying a single parameter or information register instruction (data is hexadecimal)

Example 1: Modify the ion value (register 0023H) to divalent

Send to the boarding position: 01 06__00__23___00__02__F9__C1

Answer at the disembarking position: 01 06__00__23___00__02___F9__C1

Send a message:

It is sent by the upper computer	0 1	06	0023	0002	F9C1
decimal system					
unscramble	A device with a machine address of 1	Modify the register data instruction	The atomic value is stored in the address	Change the value to 2	CRC verification

Interpretation of responses:

The lower machine should respond	0 1	06	0023	0002	F9C1
decimal system					
unscramble	A device with a machine address of 1	Answer the instruction to modify the storage register number	The value of the memory address is returned	The value has been changed to 2	CRC verification

Example 2: Set the temperature bias value (register 0021H) to-5.0℃

Send to the boarding position: 01 06__00__21___FF__CE__19__A4

Answer at the boarding position: 01 06__00__21___FF__CE__19__A4

Send a message:

It is sent by the upper computer	01	06	0021	FFCE	19A4
decimal system				-50	
unscramble	A device with a machine address of 1	Modify the register data instruction	Temperature bias storage address	Change the value to -5.0℃	CRC verificat-ion

Interpretation of responses:

The lower machine should respond	01	06	0021	FFCE	19A4
decimal system				-50	
unscramble	A device with a machine address of 1	Answer the instruct-ion to modify the storage register number	Temperature bias storage address	The value has been revised to-5.0℃	CRC verificat-ion

7 Incorrect Instruction Response Format

Lower machine error response	From the machine address	FC	Error code	CRC
	~ 01H F7H	The command function code received is + 8 0 H	The error code is shown in the protocol description	CRC is high and CRC is low
	1 byte	1 byte	1 byte	2 byte

Function code: When the instrument receives an incorrect command, it adds 80H to the function code of the received command as the function code for the response data frame. For example, if the host uses function code 03 to access and the slave responds with a function code of 83H, this indicates that the host's command is incorrect. To determine the specific error, check the error code.

Error code:

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

02: Register address error. When the register address that can be accessed 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, and this error code is returned.

04: Invalid value to modify. The data of the register to be modified exceeds the range of the register data, and this error code is returned.
05: CRC is wrong, the verification result does not match, return this error code.

06: Write error, a 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.

8 Floating Register Address (integer)

Storage address	Storage name	scope	high byte	lower byte	Read/write	remarks
0000H	The ion concentration value	0ppm~20000 ppm	16 Posture correction 0 ~ 20000		R	0x7 FFF, over the upper limit 0x8000 is the lower limit
0001H	The concentration of ions is small number and unit		decimal digits	Units (see table)	R	
0002H	Electrode signal	-750.0mV~750.0mV	16 Posture correction-7500 to 7500		R	0x7 FFF, over the upper limit 0x8000 is the lower limit
0003H	Electrode signal decimal and unit		decimal digits	Units (see table)	R	
0004H						
0005H						
0006H						
0007H						
0008H	temperature scale	-10.0℃~110.0℃	16 Posture correction-100 to 1100		R	0x7 FFF, over the upper limit 0x8000 is the lower limit
0009H	Temperature value, decimal and unit		decimal digits	Units (see table)	R	

9 Floating register address (floating point type)

Storage address	Storage name	scope	data type	Read/write	remarks
0000H 0001H	The ion concentration value	0.000~20000ppm	Floating point unit of measurement: ppm	R	
0002H 0003H	Electrode signal	-750.0mV~750.0mV	Floating-point data unit mV	R	
0004H 0005H					
0006H 0007H					
0008H 009H	temperature scale	-10.0℃~110.0℃	Floating point data unit ℃	R	110.1 is the upper limit -10.1℃ lower limit

Address of Parameter Register 10

Storage address	Storage name	span	explain	Read/write/recover	Windows default
0019H	Electrode calibration status note 4	0: Not calibrated 1: Calibrated	BIT2: 0.1ppm BIT3: 1ppm BIT4: 10ppm BIT5: 100ppm BIT5: 1000ppm	R/D	Not calibrated
001AH					
001BH					
001CH	Electrode efficiency	70.0% ~130.0%	16 The unit of measurement is 700 to 1300, with a decimal point and a percentage	R/D	100.0%
001DH	Calibrated points	0~5			0
001EH	This machine address	1~247	255 (FFH) is the general address	R/W	1
001FH	traffic rate	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200		R/W	9600
0020H	Warm supplementary type	0: Manual temperature compensation 1: Automatic temperature replenishment	This register value determines the next register meaning	R/W/D	Automatic temperature compensation
0021H	Temperature setting value (When manually warming)	-10.0℃~110.0℃	10 If the value is read to 250, the actual value is 25.0℃ Note 5	R/W/D	25.0℃
	Temperature bias value (Automatic temperature compensation)	-10.0℃~10.0℃			0.0℃

Read and write recovery attributes, where R is read, W is write, and D is to perform a restore factory Settings operation. This register is rewritten to the default value, and if D is not present, this register is not affected by the restore factory Settings operation.

Note 4 Refer to the reference standard solution code and calibration section

Note 5: The values of registers are all integers, so the values of these registers are 10 times or 100 times the actual value. For example, if the temperature reference reads 00 FAH, it converts to decimal 250, indicating 25.0℃. To write 10.0℃ into the register, you need to write the hexadecimal value 0064H, which corresponds to 100.

11 Information Register Address

Register address	Storage name	span	Read/write	remarks
0040H	work pattern	0010 H: Measurement mode 0050H: Set mode 00 60 H: Calibration mode	R/W	Note 6
0041H	Model parameters		R/W	See the specific work mode chapter introduction
0042H	Work events		R	
0043H	Standards and operations		R/W	
0044H	Instrument type	0010H: ION	R	
0045H	Instrument model	1210H	R	BCD a sign or object indicating number
0046H	software release		R	BCD a sign or object indicating number
0047H	Hardware version		R	BCD a sign or object indicating number
0048H	Instrument serial number 1		R	BCD a sign or object indicating number
0049H	Instrument number 2		R	BCD a sign or object indicating number

Note 6 When accessing the lower computer's working mode register, the return value will not be 0 at the end of the hexadecimal number; it should be treated as 0. For example, if the return value of reading the working mode register is 0011H, it actually represents 0010H, indicating that the instrument is currently in measurement mode.

12 Ion Standard Solution Code and Calibration Status

The ion can be calibrated at five points. The standard solution is represented by the BIT6 ~BIT2 in a binary number with a 16-bit integer value, and the corresponding relationship is shown in the following table

	Not used	1000ppm	100ppm	10ppm	1ppm	0. 1ppm	Not used
16 Position correction	BIT15 ~BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1 、BIT0

For example, the 0.1ppm standard solution has code 0002H

The 1ppm standard solution, code 0004H.

The 10ppm standard solution, code 0008H.

The 100ppm standard solution, code 0010H.

The 1000ppm standard solution, code 0020H.

If the value of the calibration status register is 000CH, it indicates that both the 1ppm point and the 10ppm point have been calibrated.

Table of 13 Units

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

The user can use the upper computer to send instructions through the RS485 interface to make the instrument enter the setting mode. In the setting mode, the instrument can be restored to the factory setting. The specific operation process is as follows:

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

The upper computer sends: 01 06 00 40 00 50 88 22

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

b) Write the recovery command. After the instrument enters the setup mode, use function code 06H to write the value (7FFFH) into the mode parameter register (address 0041H). This will clear all calibration information and reset the temperature mode and temperature bias to their default values (automatic temperature compensation, bias 0.0℃), as well as the necessary parameter registers. Then, restart the instrument.

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

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

8. Calibration Process

The universal ion digital electrode cannot measure ion concentrations without calibration. It must be calibrated using two or more different concentration standard solutions before it can be used. To ensure accurate and reliable measurements, users should regularly calibrate the electrode using standard solutions. The calibration of this instrument is performed by sending commands via the RS485 interface from a host computer.

1 Calibration Process

a) Put the electrode into the standard solution.

b) Write the standard solution code into the calibration status register (0043H).

c) Waiting for the calibration to be completed. You can check the calibration status by reading the value of the calibration status register (0043H). The corresponding values are as follows:

0: Calibration successful (returned to measurement mode).

1: Calibration is in progress (still in calibration mode, please read the status later).

2: The correct standard solution value is not received (it has returned to the measurement mode).

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

4: The sensor performance (slope or bias value) is out of the allowable range (returned to measurement mode).

d) To calibrate other points, repeat this process.

2 Calibration Instructions

a) The electrode can be calibrated at most five points. If the calibrated point is recalibrated again, error 2 will be prompted because the correct standard solution is not received.

b) After each successful calibration, if the ion price is set, the electrode will calculate the efficiency to judge the performance, and if it exceeds the allowable range

If the enclosure is surrounded, error 4 will be prompted and calibration will fail. The sensor performance can be checked by reading the registers such as calibration status and electrode slope.

c) Writing 7FFFH to the calibration status register (0043H) clears all calibration information.

3 Examples of Calibration Instructions

a) Calibrate the midpoint by writing the 1ppm standard solution code (0004H) into the calibration status register (0043H)

The boarding position is sent as: 01 06 0043 00 04 79 DD

Deplaning position response: 01 06 0043 0004 79 DD

) Query the calibration status and read the status indicator register

The boarding position is sent as: 01 03 0043 001 75 DE

Answer at the landing position: 01 03 02__0000 B8 44

Please refer to the explanation in the calibration process for the meaning of the value at the underline in the lower computer response.

c) After calibration, the device will return to the measurement state, regardless of whether the calibration is successful or not. Note that the code of different standard solutions should be modified and CRC should be recalculated. For specific instructions, refer to the common instructions section.

IX. Common Instructions

Read Register 1(Take Device Address 01H as an Example)

Meaning of instructions	device address	FC	Read the register, the first address	Read the number of storage devices	CRC verification
Read all floating memory type data	01	04	00 00	00 0A	70 0D
Read all floating storage registers and floating point data	01	03	00 00	00 0A	C5 CD
Read all parameter storages	01	03	00 19	00 0C	94 08
Read all information stored in the cache	01	03	00 40	00 0A	C4 19

2 Modify the Register

Meaning of instructions	device address	FC	The address of the storage device to be modified	modified value	CRC verification
Change the device address to 02	01	06	00 1E	00 02	68 0D
Change the baud rate to 2400	01	06	00 1F	00 01	79 CC
The repair and replenishment type is manual	01	06	00 20	00 00	88 00
The repair and compensation type is automatic	01	06	00 20	00 01	49 C0
Modify the temperature bias value −5.0℃	01	06	00 21	FF CE	19 A4
The ionic price is changed to 1	01	06	00 23	00 01	B9 C0
The ionic charge is changed to 2	01	06	00 23	00 02	F9 C1

Restore factory Settings (You need to execute the following two instructions)

Meaning of instructions	device address	FC	The address of the storage device to be modified	modified value	CRC verification
Make the device enter the	01	06	00	00 50	88 22

setting mode					
Send the order to resume factory production	01	06	00 41	7FFF	B9 AE

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4 Electrode Calibration

Meaning of instructions	device addr-ess	FC	The address of the storage device to be modified	modified value	CRC verificat-ion
Remove all calibration points	01	06	00 43	7F FF	18 6E
calibration 0.1ppm	01	06	00 43	00 04	F9 DF
calibration 1ppm	01	06	00 43	00 08	79 DD
calibration 10ppm	01	06	00 43	00 10	79 D8
calibration 100ppm	01	06	00 43	00 20	79 D2
calibration 1000ppm	01	06	00 43	00 40	79 C6
Check the calibration sta-tus	01	03	00 43	00 01	75 DE