SUCH

Water Quality Nitrite Sensor

User's Manual

SUCH

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1. User Notice

Thank you for your support to our company. Please read the instruction manual carefully before use to ensure proper operation of our products.

II. Product Inspection

Carefully open the packaging and inspect the instrument for any damage or missing accessories. If abnormalities are detected, immediately contact the distributor or our company.

Under no circumstances shall you disassemble the instrument without authorization. Should such actions occur, the company shall not be liable for warranty coverage.

III. Product Introduction

The product is a digital sensor, which integrates the electronic circuit and microprocessor into the sensor, and is called digital electrode.

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

6 **The PPS shell features strong corrosion resistance and 3/4-inch threads for easy installation.**

IV. Technical Parameters

Ionic concentration	Measuring range	0.5 ～62000 ppm
	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	Thermistor NTC10 K
	Temperature compensation	Auto/Manual
Data transmission	RS-485	MODBUS RTU Communication Protocol
Other parameters	Working power supply	9 ~ 27VDC
	Separation STRENGTH	2500V rms
	Product POWER	About 0.5W
	Product MATERIALS	PPS monoblock
	Way to install	3/4 inch front and rear threads

V. 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	Direct current power supply positive
	Black line	DC POWER SOURCE

VI. Communication Protocol

The instrument operates in RTU mode using the RS-485 Modbus communication protocol, with serial port parameters set to (N,8,1) — meaning no parity check and 8-bit data transmission.
The default baud rate is 9600 (modifiable) and the address is 01 (modifiable).

1 Protocol Specification

a) In this agreement, data followed by the letter "H" indicates that the data is in hexadecimal format.

b) All registers are double bytes, and the high byte is sent first, and the low byte is sent last.

c) The upper computer instruction received by the instrument is 8 bytes in length. The part beyond the 8 bytes is invalid, but the first 8 bytes of the instruction is still valid. If the instrument pauses for 0.1 second, the instruction that does not reach the 8 bytes is considered invalid.

d) For CRC verification, refer to the CRC worksheet. The high byte is sent first, followed by the low byte. When the checksum is 2A2AH, the instrument skips verification.

2 Overview of Registers

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., with a total of 20 registers**
Address, 0000H to 0013H (decimal 0 to 19), can be read using function codes 03 or 04.

When using function code 04 to read data, the instrument returns measurement data as an integer. Each data entry consists of two parts: the first part is the integer value, occupying one register, and the second part is the decimal digit count and unit, sharing one register with each occupying one byte. Refer to the unit code table for unit codes.

When using function code 03, the instrument returns floating-point measurement data, with each data point occupying two registers.
(4 bytes) represents floating-point data, with the default unit.

b) **The parameter register contains the calibration status of the instrument and some parameters that can be set by the user. There are 40 register addresses, 0014H～003BH (decimal 20～59). The function code 03 is used to read the register data, and the function code 06 is used to write the register with writable attributes, such as modifying the communication baud rate and instrument ID.**

c) **The information register stores the instrument's operational status and basic parameters, including serial number and model. It comprises 20 register addresses (003CH to 004FH, corresponding to decimal 60-79). Function code 03 is used to read register data, while function code 06 enables writing to writable registers for instrument operations such as calibration.**

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

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

	From THE AIRPORT	FC	Range OF RESIDENT ADRESSES	Number of registers read N	CRC
Upper computer instruction set	~01H F7H	03 or 04	~0000H 0013H	1 to 20	CRC Gao CRC low
	1 byte	1 byte	2 byte	2 byte	2 byte

	From THE AIRPORT	FC	Bytes	Data FROM N REGISTERS	CRC
Lower @-@ level COMPUTER RESPONSES ARE NORMAL	~01H F7H	03 or 04	N*2	Data	CRC Gao CRC low
	1 byte	1 byte	1 byte	N*2 bytes	2 byte

Example of reading floating-point data from floating-point registers: (Data sent and received is in hexadecimal format) Example: Read 10 floating-point data from floating-point registers starting at address 0000H, totaling 5 floating-point data.

Send from the computer: 01 03 00 00 00 0A C5 CD

Downlink response: 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 interpretation:

Upper computer sends	01	03	0000	000A	C5 CD
Decimal system	1	3	0	10	
Unscramble	Device with slave address 1	Read floating @-@ point data from a floating @-@ point register	Start from address 0000H	Read 10 registers	CRC verification

interpretAT IQN OF THE RESPONSE S (See Floating Registry Address Table)

Lower @-@ level COMPUTER RESPONSE	01	03	14
Decimal system	1	3	20
Unscramble	Device with slave address 1	Floating @-@ point data read command for response floating @-@ storage unit	10 Each register is 20 bytes in length.

Lower @-@ level COMPUTER RESPONSE	0000	4120	3333	42C8
Residence	0000H	0001H	0002H	0003H
Registrant NAME	Ion concentration values		Electrode signal value	
Floating number	10. 00		100. 1	
Unscramble	Ion concentration: 10.00 ppm		Electrode signal value: 100.1 mV	

Lower @-@ level COMPUTER RESPONSE	0000	0000	0000	0000
Residence	0004H	0005H	0006H	0007H
Registrant NAME				
Floating number				
Unscramble	Insignificance		Insignificance	

Lower @-@ level COMPUTER RESPONSE	E3E8	41C7	430C
Residence	0008H	0009H	
Registrant NAME	Temperature scale		
Floating number	24. 986282		
Unscramble	Temperature: 25.0℃		CRC verification

Example of reading integer data from floating-point register instruction: (data sent and received in hexadecimal format)

Example: Read 10 floating-point integer values starting from address 0000H

Send from the computer: 01 04 00 00 00 0A 70 0D

Downlink response: 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 interpretation:

Upper computer sends	01	04	0000	000A	700D
Decimal system	1	4	0	10	
Unscramble	Device with slave address 1	Read floating register integer data	From address 0000H Begin	Read 10 registers	CRC verification

Response Interpretation **(See Floating Register Address Table)**

Lower @-@ level COMPUTER RESPONSE	01	04	14
Decimal system			20
Unscramble	**Device with slave address 1**	**Response to floating register format data read command**	**10 Each register is 20 bytes in length.**

Lower @-@ level COMPUTER RESPONSE	03EB	0211		03EC	0100	
Residence	0000H	0001H		0002H	0003H	
Registrant NAME	**Ion concentration values**	**Ion concentration values**		**Electrode signal value**	**Electrode signal value**	
		Decimal	**Unit**		**Decimal**	**Unit**
		02	11		01	00
Decimal system	1000			1001		
Unscramble	**Ion concentration: 10.00 ppm**			**Electrode signal value: 100.1 mV**		

Lower @-@ level COMPUTER RESPONSE	0000	0000		0000	0000	
Residence	0004H	0005H		0006H	0007H	
Registrant NAME						
Decimal system						
Unscramble	**Insignificance**			**Insignificance**		

Lower @-@ level COMPUTER RESPONSE	00FA	010B		C751
Residence	0008H	0009H		
Registrant NAME	**Temperature value**	**Temperature scale**		
		Decimal	**Unit**	
		01	0B	
Decimal system	250			
Unscramble	**Temperature value: 25.0℃**			**CRC verification**

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

Host computer instruction format	From THE AIRPORT	FC	Range OF RESIDENT ADRESSES	Number of registers read N	CRC
	~01H F7H	03	~00014H 003BH	1 to 40	CRC Gao CRC low
	1 byte	1 byte	2 byte	2 byte	2 byte

The slave responds normally	From THE AIRPORT	FC	Bytes	Data FROM N REGISTERS	CRC
	~01H F7H	03	N*2	Data	CRC Gao CRC low
	1 byte	1 byte	1 byte	N*2 bytes	2 byte

Example of reading parameter register data instruction: (data for transmission and response in hexadecimal format)

Example: Read 7 parameter registers starting from address 001EH

Send from the computer: 01 03 00 1E 00 06 A5 CE

Downlink response: 01 03 0C 00 01 00 03 00 01 00 00 00 00 01 52 7C

Send interpretation:

Upper computer sends	01	03	001E	0006	A5 CE
Decimal system	1	3	30	6	
Unscramble	Device with slave address 1	Read @-@ in @-@ memory @-@ data	Start from address 001 EH	Read 6 registers	CRC verification

interpretAT IoN OF THE RESPONSE S **(See the parameter register address table)**

Lower @-@ level COMPUTER RESPONSE	01	03	0C
Decimal system	1	3	12
Unscramble	Device with slave address 1	Response parameter register count data read command	6 Each register is 12 bytes long.

Lower @-@ level COMPUTER RESPONSE	0001	0003	0001	0000
Residence	00 1 EH	00 1 FH	0020H	0021H
Registrant NAME	**Local address**	**Traffic rate**	**Supplementation**	Temperature SETTING VALUE BY TEMPERATURE DEVIATION OR MANUALLY SETTING VALUE
Decimal system	1	3	1	0
Unscramble	**The local address is 1**	3 Corresponding to Note 1 of 9600	1 corresponding automatic temperature compensation **Note 1**	**0 Indicates a bias of 0.0°C Note 2**

Lower @-@ level COMPUTER RESPONSE	0000	0001	527C
Residence	0022H	0023H	
Registrant NAME	**Unused**	Ionic valency **0 no dissociation of** **ion 1: monovalent** **ion** **2 : divalet ion**	
Decimal system	0	0	
Unscramble		**1 corresponding monovalent**	**CRC verification**

Note 1 **The meaning of the data value in the partial interpretation only lists the meaning of the current value. For the meaning of other values, please refer to the detailed description of the parameter register.**

Note 2 **The temperature offset setting value or manual temperature setting value (0021H) register is a temperature-compensated register (0020H)**

If the temperature compensation type is manual, this register stores the manual temperature setting. For automatic compensation, it stores the temperature offset setting. The register is a 10-ary value. For example, reading 00FAH converts to 250 in decimal, representing 25.0°C. To write 10.0°C to the register, write the corresponding hexadecimal value 0064H.

5 Read the information register data instruction format function code.
3

Host computer instruction format	From THE AIRPORT	FC	Range OF RESIDENT ADRESSES	Number of registers to read N	CRC
	~01H F7H	03	0003CH ~ 004 FH	1 to 20	CRC Gao CRC low
	1 byte	1 byte	2 byte	2 byte	2 byte

The slave responds normally	From THE AIRPORT	FC	Bytes	Data from N registers	CRC
	~01H F7H	03	N*2	Data	CRC Gao CRC low
	1 byte	1 byte	1 byte	N*2 bytes	2 byte

Example of reading information register data instruction: (data for transmission and response in hexadecimal format)

Example: Read 10 information registers starting from address 0040H

Send from the computer: 01 03 00 40 00 0A C4 19

Downlink response: 01 03 14 00 10 00 00 00 00 00 00 00 00 10 12 10 01 00 01

01 12 34 AB CD 59 35

Send interpretation:

Upper computer sends	01	03	0040	000A	C419
Decimal system				10	
Unscramble	Device with slave address 1	Read @-@ in @-@ memory @-@ data	Start from address 0040H	Read 10 registers	CRC verification

Response interpretation: **(See the Information Register Address Table)**

Lower @-@ level COMPUTER RESPONSE	01	03	14
Decimal system			20
Unscramble	Device with slave address 1	Response @-@ message storage data readout command	10 Each register is 20 bytes in length.

Lower @-@ level COMPUTER RESPONSE	0010	0000	0000	0000
Residence	0040H	0041H	0042H	0043H
Registrant NAME	**Work pattern**	**Mode Parameter 1**	**Work EVENT**	**Status INDICATION**
Unscramble	**Current MEASUREMENT MODE**	**This is not significant**	**This is not significant**	**This is not significant**

Lower @-@ level COMPUTER RESPONSE	0010	1210	0100	0101
Residence	0044H	0045H	0046H	0047H
Registrant NAME	**Device type**	**Unit type**	**Software release**	**Hardware Version**
Unscramble	**Device model: ION1210**		1.00	1.01

Lower @-@ level COMPUTER RESPONSE	1234	ABCD	5935
Residence	0048H	0049H	
Registrant NAME	**Sequence number high**	**Low serial number**	
Unscramble	**Device serial number 12 3 4 ABCD**		**CRC verification**

6 modify single parameter or message storage data command format function code 6

	From THE AIRPORT	FC	Address OF THE RESIDENTS TO BE MODIFIED	Modified value	CRC
Upper computer instruction set	01H ~ F7H	06	Address of a register with a writable attribute in the register	Data	CRC Gao CRC low
	1 byte	1 byte	2 byte	2 byte	2 byte

	From THE AIRPORT	FC	MODIFIED RESIDENTIAL ADDRESSES	Modified value	CRC
Lower @-@ level COMPUTER RESPONSES ARE NORMAL	01H ~ F7H	06	Residence	Data	CRC Gao CRC low
	1 byte	1 byte	2 byte	2 byte	2 byte

Example of modifying a single parameter or information register instruction (data in hexadecimal format):

Example 1: Modify the ion value (register 0023H) to 2

Send from the computer: 01 06 00 23 00 02 F9 C1

Downlink response: 01 06 00 23 00 02 F9 C1

Send interpretation:

Upper computer sends	01	06	0023	0002	F9C1
Decimal system					
Unscramble	Device with slave address 1	Register data instruction	Ion @-@ value @-@ resident @-@ address	Change the value to 2	CRC verification

Response interpretation:

Lower @-@ level COMPUTER RESPONSE	01	06	0023	0002	F9C1
Decimal system					
Unscramble	Device with slave address 1	Response @-@ modified storage @-@ number data command	Ion @-@ value @-@ resident address	The value has been changed to 2.	CRC verification

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

Send from the computer: 01 06 00 21 FF CE 19 A4

Downlink response: 01 06 00 21 FF CE 19 A4

Send interpretation:

Upper computer sends	01	06	0021	FFCE	19A4
Decimal system				−50	
Unscramble	Device with slave address 1	Register data instruction	Temperature @-@ offset storage unit address	Value was modified to-5.0℃	CRC verification

Response interpretation:

Lower @-@ level COMPUTER RESPONSE	01	06	0021	FFCE	19A4
Decimal system				−50	
Unscramble	Device with slave address 1	Response @-@ modified storage @-@ number data command	Temperature @-@ offset storage unit address	The value has been modified to-5.0℃	CRC verification

7 Error Command Response Format

Lower machine error response	From THE AIRPORT	FC	Error code	CRC
	~01H F7H	Received command function code +8 0 H	Error CODES See protocol notes	CRC Gao CRC low
	1 byte	1 byte	1 byte	2 byte

Function code: When an instrument receives an erroneous command, it appends 80H to the received function code as the response data frame's function code. For example, if the host computer accesses using function code 03 and the slave computer replies with function code 83H, this indicates an error in the host's command. The specific error requires checking the error code.

Error code:

01: Invalid function code. This protocol only supports function codes 03,04, and 06. If the function code is not one of these, this error code is returned.

02: Register address error, when the register address that the function code can access exceeds the corresponding allowable range, this error code is returned.

03: Invalid register count. The number of registers to read exceeds the range for the current register type. This error code is returned.

04: Invalid modification. The data to be modified exceeds the register's valid range. This error code is returned.

05: CRC error. The verification result does not match. Return this error code.

06: Write error. A write (modification) operation was performed on a read-only register. Accessing the read-only register with function code 06 returns this error code.

8 Floating Register Address (Integer)

Residence	Registrant NAME	Scope	High byte	Lower byte	Read/Write	Remarks
0000H	Ion concentration values	0ppm~20000 ppm	16 Position adjustment 0~20000		R	0x7 FFF exceeds the limit 0x8000 is below the lower limit
0001H	Fractional ion concentration values and unit		Decimal digits	Unit (lookup)	R	
0002H	Electrode signal	-750.0mV~750.0mV	16 Position adjustment-7500~7500		R	0x7 FFF exceeds the limit 0x8000 is below the lower limit
0003H	Electrode signal count and unit		Decimal digits	Unit (lookup)	R	
0004H						
0005H						
0006H						
0007H						
0008H	Temperature scale	-10.0 ℃ ~110.0 ℃	16 Position adjustment-100~1100		R	0x7 FFF exceeds the limit 0x8000 is below the lower limit
0009H	Temperature value decimal and unit		Decimal digits	Unit (lookup)	R	

9 floating register address (floating point)

Residence	Registrant NAME	Scope	Data type	Read/Write	Remarks
0000H	Ion concentration values	0.000~20000ppm	Floating @-@ point data unit ppm	R	
0001H					
0002H	Electrode signal	-750.0mV~750.0mV	Floating @-@ point data unit mV	R	
0003H					
0004H					
0005H					
0006H					
0007H					
0008H	Temperature scale	-10.0 ℃ ~110.0 ℃	Float data unit ℃	R	110.1 Upper limit-10.1 ℃ Lower limit
0009H					

10 Parameter Register Address

Residence	Registrant NAME	Span	Explain	Read/Write/Restore	Windows default
0019H	Electrode calibration status Note 4	0Not calibrated 1 Calibrated	BIT2: 0.1 ppm BIT3: 1ppm BIT4: 10ppm BIT5: 100 ppm BIT5: 1000ppm	R/D	Not calibrated
00 1AH					
00 1 BH					
00 1CH	Electrode efficiency	70. 0% ~130. 0%	16 700 to 1300 decimal places by default%	R/D	100. 0%
00 1 DH	Calibrated points	0 ~ 5			0
00 1 EH	Local address	1 ~ 247	255 (FFH) is the general address	R/W	1
00 1 FH	Traffic rate	0: 1200 1 : 2400 2 : 4800 3 : 9600 4: 19200		R/W	9600
0020H	Supplementation	0 Manual warming 1 auto warming	This RESERVOIR VALUE DETERMINES THE SIGNIFICANCE OF THE NEXT RESERVOIR	R/W/D	Automatic temperature compensation
0021H	Temperature setting (for manual warming)	−10. 0 ℃ ~110. 0 ℃	10 If the multiplier reads 250, the actual value is 25.0℃. Note 5	R/W/D	25. 0 ℃
	Temperature offset value (automatic temperature compensation time)	−10. 0 ℃ ~10. 0 ℃			0. 0 ℃

Read/Write restore property: R indicates read-only, W indicates write-only, and D indicates restore factory settings. This register is overwritten with the default value if D is present; otherwise, it remains unaffected by restore factory settings.

Note 4 **Refer to the section on standard solution codes and calibration**

Note 5 **The values of these registers are all integer types, so the values of such registers are 10 or 100 times the actual value. For example, if the temperature reference reads 00FAH, it converts to decimal 250, indicating 25.0°C. To write 10.0°C into the register, you need to write the corresponding hexadecimal value 0064H.**

11 Information Register Address

Register address	Registrant NAME	Span	Read/Write	Remarks
0040H	Work pattern	00 10 H: Measurement Model 0050H: Set mode 00 60 H: Calibration Model	R/W	Note 6
0041H	Pattern parameter		R/W	See the section on specific work modes
0042H	Work EVENT		R	
0043H	Calibration STATUS AND OPERATIONS		R/W	
0044H	Instrument TYPE	0010H: ION	R	
0045H	Instrument MODEL NUMBER	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 Serial Number 2		R	BCD a sign or object indicating number

Note 6 **When accessing the lower computer's working mode register, the return value may not be 0 in the last hexadecimal bit. It should be treated as 0. For example, if the working mode register is read, the return value is 0011H (equivalent to 0010H), indicating that the instrument is currently in measurement mode.**

12 Code and Calibration Status of Ion Standard Solution

The ion calibration can be performed at five points. The standard solution is represented by the binary value of a 16-bit integer, with BIT6 to BIT2 used for representation, as shown in the table below.

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

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

1ppm standard solution, code 0004H.

10ppm standard solution, code 0008H.

100 ppm standard solution, code 0010H.

1000ppm standard solution, code 0020H.

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

13 Unit Comparison Table

Data	00H	01H	02H	03H	04H	05H	06H
Unit	mV	nA	uA	mA	Ω	K Ω	M Ω
Data	07H	08H	09H	0AH	0 BH	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. Set Mode

The user can use the host computer to send the instruction 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 setup mode. Write the value (0050H) to the working mode register (address 0040H) using the 06H function code to activate the instrument's setup mode.

The host machine sends: 01 06 00 40 00 50 88 22

Slave machine reply: 01 06 00 40 00 50 88 22

b) Write the recovery command. After the instrument enters the setup mode, use the 06H function code to write the value (7FFFH) into the mode parameter register (address 0041H). The instrument will clear all calibration information, restore the temperature mode and temperature offset to default values (automatic temperature compensation, offset 0.0°C), and reset the parameter registers to default values. Then restart the instrument.

The host machine sends: 01 06 00 41 7F FF B9 AE

Slave machine reply: 01 06 00 41 7F FF B9 AE

8. Calibration Process

General ion digital electrodes cannot calculate ion concentration values without calibration. They must be calibrated with two or more standard solutions of different concentrations before use. To ensure measurement accuracy and reliability, users should also use standard solutions and perform regular electrode calibration. The calibration process for this instrument is completed by sending commands through the RS485 interface from a host computer.

1 Calibration Process

a) **The electrode was placed in the standard solution.**

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

c) **Waiting for calibration completion. Check the calibration status by reading the value in the calibration status register (0043H). The corresponding values are as follows:**

0 Calibrated successfully (returned to measurement mode).

1 Calibration in progress (still in calibration mode. Check the status later).

2 : Failed to receive the correct standard solution value (returned to measurement mode).

3 The signal is unstable or out of range within 180 seconds (measurement mode has been returned).

4 Sensor performance (slope or bias value) exceeds the allowable range (measurement mode returned).

d) **To calibrate other points, repeat this process.**

2 Calibration Instructions

a) **The electrode can calibrate up to five points. If recalibration is attempted at a calibrated point, error 2 will be displayed, indicating the correct standard solution was not received.**

b) **After each successful calibration point, if the ion valence is set, the electrode will calculate efficiency to evaluate performance, and if it exceeds the allowable range...**

If the error 4 occurs, the calibration fails. You can check the sensor performance by reading the calibration status, electrode slope, and other registers.

c) **Writing 7FFFH to the calibration status register (0043H) will erase all calibration data.**

3 Example of Calibration Instruction

a) **Calibrate the midpoint, write the 1ppm standard solution code (0004H) into the calibration status register (0043H)**upper bit send: 01 06 0043 00 04 **79 DD**

Downlink response: 01 06 0043 0004 **79 DD)**

Query calibration status, read status indicator register

Send from the computer: 01 03 0043 001 **75 DE**

Exit response: 01 03 02 *0000* **B8 44**

For the numerical meaning of the values underlined in the slave machine response, please refer to the explanation in the calibration procedure.

c) **After calibration is completed, the device will return to measurement mode regardless of calibration success. Note that the codes of different standard solutions should be modified and CRC recalculated. For specific instructions, refer to the Common Commands section.**

IX. Common Commands

1 Read Register **Take the Device Address 01H as an Example**

Significance OF THE INSTRUCTION	Device address	FC	Read register first address	Number OF READ REGISTERS	CRC verification
Read all floating @-@ register integer data	01	04	00 00	00 0A	70 0D
Read all floating @-@ point data in floating @-@ point registers	01	03	00 00	00 0A	C5 CD
Read all parameter registers	01	03	00 19	00 0C	94 08
Read all message buffers	01	03	00 40	00 0A	C4 19

2 Modify Register

Significance OF THE INSTRUCTION	Device address	FC	Address OF THE REGISTERS TO BE MODIFIED	Modified value	CRC verification
Change the facility 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
Modifying the warming @-@ tonifying type to manual	01	06	00 20	00 00	88 00
Modifying the warming and tonifying type to automatic	01	06	00 20	00 01	49 C0
Temperature @-@ SETTING MODIFICATION −5. 0 ℃	01	06	00 21	FF CE	19 A4
Change the ion value to 1	01	06	00 23	00 01	B9 C0
Change the ion to 2-valent	01	06	00 23	00 02	F9 C1

3Restore factory settings **(execute the following two commands)**

Significance OF THE INSTRUCTION	Device address	FC	Address OF THE REGISTERS TO BE MODIFIED	Modified value	CRC verification
Enable the device to enter the setup mode	01	06	00 40	00 50	88 22
Send a command to restore the factory	01	06	00 41	7FFF	B9 AE

4 Electrode Calibration

Significance OF THE INSTRUCTION	Device address	FC	Address OF THE REGISTERS TO BE MODIFIED	Modified value	CRC verification
Clear 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
Status OF THE CONSULTATION AND ACCURACY	01	03	00 43	00 01	75 DE