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SE-ISEP10-G Conductivity Sensor

Type 1

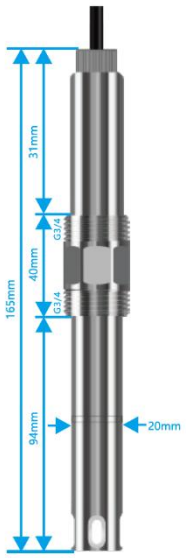
Type 2

Type 3

Type 4

1. Specification

- Measure range:0…40000μS/cm optional
- Temperature measurement range: 0.0…60.0℃
- Accuracy: ±2%FS
- Resolution ratio: 0.01μS/cm
- Housing material: PPS, ABS, PC, SS316
- Compensation Mode: Auto/Manual
- Thread: M39*1.5, G3/4, G1
- Power supply: DC 9~30V (Suggested 12V)
- Output signal: RS485(Modbus RTU), 4~20mA
- Signal cable length: 5m (customizable)
- Withstand pressure range: 0…4bar
- Output Load: ＜750Ω
- Housing protection Grade: IP68



Type 5

2 . Pre-use instructions

2.1 The instructions apply to the Smart Conductivity Series electrodes and should be read carefully before using.

2.2 Before opening the package, please check whether there is any damage to the package. If the package is damaged, please do not open the package, but please contact the sales company, the nearest authorized agent or us directly. When the representative of the transporting arrives, please open the package together to check whether the electrodes are damaged or not, and it is recommended to take photos for evidence.

2.3 If the package is intact but the electrode is damaged, please contact the sales company, the nearest authorized agent or us directly, and send the electrode with the original package back.

2.4 Conductivity electrodes need to be dried before storage.

2.5 Any dirt, adhesion or scale on the front of the electrode during measurement will cause inaccuracy or fluctuation of the measurement value, so it should be cleaned and calibrated in time.

2.6 Caution: When reading register data, do not read more than 20 consecutive registers, and the unlisted address registers are not allowed to read or write data.

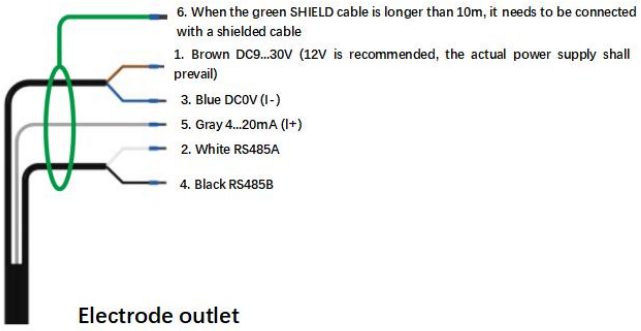
2.7 If you have any questions about the use of the parts, please contact our technical staff.

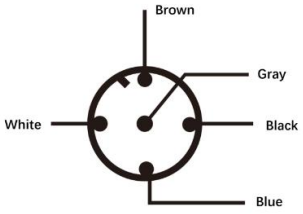
2.8 The contents of this manual are subject to change with the continuous improvement of the product, we will not give any notice in the manual, and we will not undertake the consequences thereof.

3. Wiring

3.1 Follow the instructions carefully for wiring , incorrect wiring will result in complete damage to the product.

3.2 It is strictly prohibited to supply power before all cables are connected to avoid danger. Before powering up the system, be sure to check all wiring carefully and make sure it is correct before powering up.





M12 interface electrode wiring (only for flow-through use)

4. Electrode Polarization

The electrode is placed in the solution to be measured and connected to the power supply, and polarization begins when the power is turned on.

5. Electrode calibration

5.1 The electrode has been calibrated before shipment, and the user can use it directly.

5.2 In order to ensure the measurement accuracy of the conductivity electrode, the electrode constant should be re-calibrated before using, and at the same time, the conductivity electrode constant should be calibrated regularly, and the conductivity electrode should be replaced in time if there is a large deviation.

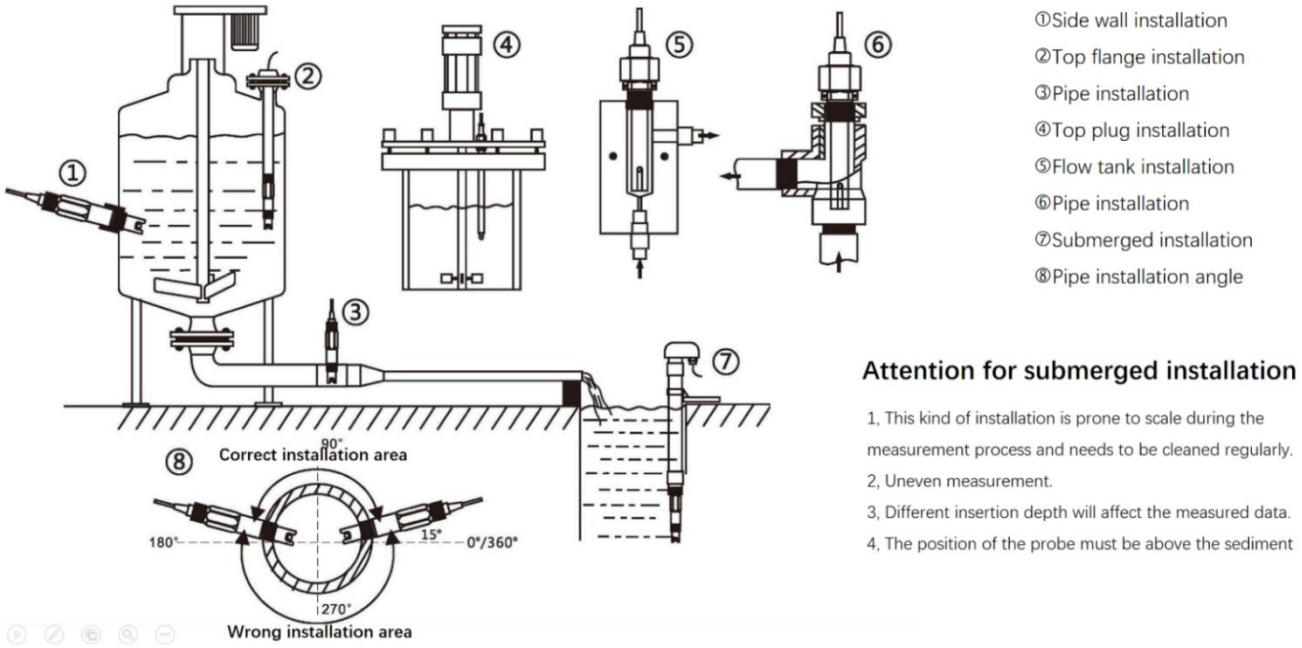
5.3 It is recommended to calibrate the electrode once every 1 to 2 months.

6 . Electrode Installation

6.1 Conductivity electrodes are generally recommended to be installed in a flow-through tank for more stable and accurate measurements.

6.2 For pipe installation, 15° - 165° is the correct installation area, the rest is the wrong area.

6.3 Installation method



Note: Please contact with us if there is any special requirements on function or specification.

7 . Electrode communication

7.1 Default Communication Instructions:

Note: 1 . Data starting with 0x is represented in hexadecimal.

2 . The checksum is 16CRC with the low byte first and the high byte second.

3 . Float (floating point number) occupies four bytes.

7.2 Factory Default Communication Parameters :

Factory Default Communication Parameters	
Baud rate for communication	9600(Default)
Number of data bits	8
Number of stop bits	1
parity calibration bit	None
Address	1 (Default)

7.3 The Upper computer sends format:

	Data type	Definition	Remark
Integer	16-bit integer	Indicates that the high and low bytes of a word element are not reversed.	Example:0x 0032 to decimal number is 50.
Floating number	ABCD	Indicates a sequential parsing	Example:41 DB 72 37 to floating point is 27.4.
	CDAB (3412)	Indicates that the high and low bytes of a double-byte component are reversed, but the high and low bytes of the word are not reversed.	Example:72 37 41 DB transfers to floating point, CDAB changes order to ABCD . The 41 DB 72 37 to floating point is 27.4.

7 . 4 Function Code Description

7.4.1 This product supports common function codes,such as 03 , 06 , 16 and so on.

7.4.2 The output register uses 16 function codes for double-word data write operations or batch writing of multiple data.

03	Read single or multiple registers
06	Write Single register
16	Write multiple registers

7 .5 Read floating point number

7.5.1 The Upper computer sends format

	Device ID Address	Function code	Register Starting Address		Number of registers		CRC16	
			High byte	Low byte	High byte	Low byte	high byte	Low byte
Example 1 Reading the conductivity value	0x 01	0x 03	0x 00	0x 00	0x 00	0x 02	0x C4	0x 0B
Example 2 Reading the resistivity value	0x 01	0x 03	0x 00	0x 02	0x 00	0x 02	0x 65	0x CB
Example 3 Reading the temperature value	0x 01	0x 03	0x 00	0x 04	0x 00	0x 02	0x 85	0x CA
Example 4 Reading the TDS value	0x 01	0x 03	0x 00	0x 06	0x 00	0x 02	0x 24	0x 0A
Example 5 Reading the salinity value	0x 01	0x 03	0x 00	0x 08	0x 00	0x 02	0x 45	0xC9

7.5.2 Response format of the lower computer

	Device ID Address	Function code	Number of Byte	Data Content				CRC1 6	
				C	D	A	B	Low byte	High byte
Example 1 Conductivity value return	0x 01	0x 03	0x 04	0x 89	0x C7	0x 3E	0x 95	0x B1	0x 9D
Example 2 Resistivity value return	0x 01	0x 03	0x 04	0x 35	0x 1D	0x 45	0x 7B	0x 17	0x 4A
Example 3 Temperature value return	0x 01	0x 03	0x 04	0x BD	0x E0	0x 41	0x 8C	0x EE	0x 5C

Example 4 TDS value return	0x 01	0x 03	0x 04	0x 08	0x 8C	0x 43	0x 12	0x 88	0x 85
Example 5 The salinity value is returned	0x 01	0x 03	0x 04	0x 08	0x 8C	0x 43	0x 12	0x 88	0x 85

Note: BD E0 41 8C to floating point to floating point number , CDAB change order to ABCD, that is 41 8C BD E0 to floating point is 17.59.

7.6 Write floating point number

7.6.1 The Upper computer sends format

	Device ID Address	Function code	Register Starting Address		Number of registers		Number of Bytes	Write register data with hexadecimal floating point number				CRC1 6	
			High byte	Low byte	High byte	Low byte		C	D	A	B	Low byte	High byte
Example 1 Write the conductivity constant	0x 01	0x 10	0x 00	0x 0A	0x 00	0x 02	0x 04	0x 00	0x 00	0x 3F	0x 80	0x 63	0x 80

7.6.2 Response format of the lower computer

	Device ID Address	Function code	Register Starting Address		Number of registers		CRC16	
			High byte	Low byte	High byte	Low byte	Low byte	High byte
Example 1 Conductivity constant return	0x 01	0x 10	0x 00	0x 0A	0x 00	0x 02	0x 61	0x CA

Note: The conductivity constant is changed to 1.00, converted to hexadecimal 0 x 3F800000 and written into the 0x 0A register.

7.7 Write an integer

7.7.1 The Upper computer sends format

	Device ID Address	Function code	Register Starting Address		Write register data with hexadecimal floating point number		CRC1 6	
			High byte	Low byte	A	B	Low byte	High byte
Example 1 Write Device Address	0x 01	0x 06	0x 00	0x 1 4	0x 00	0x 02	0x 48	0x 0F

7.7.2 Response format of the lower computer

	Device ID Address	Function code	Register Starting Address		Write register data with hexadecimal floating point number		CRC1 6	
			High byte	Low byte	A	B	Low byte	High byte
Example 1 Device address return	0x 01	0x 06	0x 00	0x 1 4	0x 00	0x 02	0x 48	0x 0F

Note: To change the local address from 1 to 2, write the hexadecimal number 0x 00 02 to the 0x 00 14 register.

7.8 Calibration instructions

7.8.1. Step 1: Change the electrode constant to 1 .

Write data 1 (1 is floating point number, converted to hexadecimal as 3F 80 00 00, the sequence is ABCD,and change the sequence to CDAB,it is 00 00 3F 80) to register 0X0A.

Send command:01 10 00 0A 00 02 04 00 00 3F 80 63 80

Return data:01 10 00 0A 00 02 61 CA

7.8.2 Step 2: The electrode is cleaned and dried and placed in the standard solution.

Send command:01 03 00 00 00 02 C4 0B (read the measured value)

Return data: 01 03 04 99 9A 3F B9 24 C2

99 9A 3F B9 is the measured value, and the sequence CDAB is transposed to ABCD, it is 3F B9 99 9A, and the floating point number is 1.45, so the current measured value is 1.45, then the current measured value is 1.45ms/cm.

After the measured value is stabilized, calculate the conductivity constant, constant = standard liquid value/current measured value.

For example, if the sensor is placed in a standard liquid of 1.413mS/cm,and read the sensor

current measurement value of 1.450mS/cm

So, the constant is = 1.413/1.450 =0.97448

To write data to the 0x0A register 0.97448 (0.97448 is a floating point number, converted to hexadecimal as 3F 79 77 85 in the order ABCD, transposed to CDAB ,it is 77 85 3F 79).

Send command: 01 10 00 0A 00 02 04 77 85 3F 79 A9 9F

Return data: 01 10 00 0A 00 02 61 CA

Complete the calibration

7.9 The instruction of floating-point number hexadecimal order

Changing the floating-point hexadecimal order

0x32 register writes data 0, the floating-point order is 1234 (ABCD.).

0x32 register writes data 1, the floating point order is 3412 (CDAB).

Example: To change the floating point order of the sensor to 3412, the instruction is as

follows

01 06 00 32 00 01 01 E9 C5

Note: When the floating point number hexadecimal order is changed to 1234, the read and write order is also 1234.

7 . 10 Description of the address

Register Name	Data Addresses	Date Type	Length (characters)	Read/Write	Remark
Conductivity value	0X 00 00	Float	2	R	The default unit is ms/c m. If you need to change the unit to μS/cm by multiplying by 1000.
Resistivity value	0X00 02	Float	2	R	Ω · cm
Temperature	0X 00 04	Float	2	R	℃
TDS	0X 00 06	Float	2	R	ppm or mg/L
Salinity	0X 00 08	Float	2	R	ppm or mg/L
Conductivity constant	0X 00 0A	Float	2	R/W	
Compensation factor	0X 00 0C	Float	2	R/W	
Manual temperature compensation	0X 00 0E	Float	2	R/W	
Temperature offset	0X 00 10	Float	2	R/W	
Baud rate	0X 00 12	Float	2	R	
Slave Addresses	0X 00 14	Float	2	R	
Filtering second	0X 00 16	Float	2	R	
Electrode Sensitivity	0X 00 18	Float	2	R	
compensation mode	0X 00 1A	Float	2	R	
P/N: Compensation Type	0X 00 1C	Float	2	R	50.0 - PT1 000 50 .1 - NTC10K
4 - 20mA high point value	0X 00 20	Float	2	R	
Modify the baud rate	0X 00 12	signed	1	W	2400 , 4800 , 9600 , 1 9200,38400 , 43000 , 57600
Modify the slave address	0X 00 14	signed	1	W	1 - 254
Modify the filter seconds	0X 00 16	signed	1	W	value in seconds
Modifying the compensation model	0X 00 1A	signed	1	W	0 is for automatic, 1 is for manual
Adjust floating point order	0X 00 32	signed	1	W	0 is forward, 1 is reverse.
Modify the warming type	0X 00 33	signed	1	W	0 is for PT1000 , 1 is for NTC10K
Restore the default values	0X 00 64	signed	1	W	1
Restore baud rate and address	0X 27 0F	signed	1	W	1
Modify 4-20mA high point value	0X 00 20	Float	2	W	

Note: When reading register data, do not read more than 20 consecutive registers, and the unlisted address registers are
not allowed to read or write data.

7.11 Examples of Common Instruction Sets

	Function	Send Command	Return Command	Remark

1	Read Conductivity value	010300000002C40B	01030489C73E95B19D	Convert 3E9589C7 to floating point as 0 . 292.
2	ReadResistivity value	01030002000265CB	010304351D457B174A	Convert 457B351D to floating point as 401 9.3
3	Read Temperature	01030004000285CA	010304BDE0418CEE5C	Convert 418CBDE0 to floating point as 17.59.
4	Read TDS	010300060002240A	010304088C43128885	Convert 4312088C to floating point as 146 . 03.
5	Read Salinity	01030008000245C9	010304088C431 28885	Convert 4312088C to floating point as 146 .03.
6	WriteConductivity constant	0110000A000204CCCD3F8CCD2A	0110000A000261CA	Convert 3F8CCCCD to floating point as 1.100.
7	WriteCompensation factor	0110000C000204D70A3CA3BB35	0110000C000281CB	Convert 3CA3D70A to floating point as 0.02.
8	WriteManual temperature compensation	0110000E000204000041A0420B	0110000E0002200B	Convert 41A00000 to floating point as 20.0.
9	Write Temperature offset	011000100002040000 3F80E2F3	01100100002400D	Convert 3F800000 to floating point as 1.
10	Read Baud rate	010300120002640E	01030400004616499D	Convert 46160000 to floating point as 9600.
11	Read Slave Address	01030040002840F	01030400003F80EA63	Convert 3F800000 to floating point as 1.
1 2	Read compensation mode	0103001A0002E5CC	01030400003F80EA63	Convert 3F800000 to floating point as 1 is automatic.
1 3	Read P/N: Compensation Type	010300C000205CD	010304666642483432	Convert 42486666 to floating point as 50.1.
1 4	Read 4 - 20mA high point value	010300200002C5C1	01030440004 59CDD0A	Convert 459C4000 to floating point as 5000.
1 5	Write baud rate	0106001209602FB7	0106001209602FB7	Modify to 2400
16	Writethe slave address	010600140002480F	010600140002480F	Modify to 2
1 7	Write the compensation mode	0106001A000169CD	0106001A000169CD	Modify to automatic
1 8	WriteAdjust floating point order	010600320001E9C5	010600320001E9C5	Revised to CDAB (341 2)
1 9	Write the restore default values	010600640001 09D5	010600640001 09D5	Write 1 to confirm
20	Write the restore baud rate and address	0106270F000172BD	0106270F000172BD	Write 1 to confirm
21	Write the modify 4-20mA high point value	011000200002040000 4120C03F	0110002000024002	Modified to 10

8 . Maintenance and Storage

8.1 The electrodes can be cleaned of organic dirt with warm water containing detergent, or with alcohol, and after cleaning the electrodes can only be dried with a soft paper towel.

8.2 When storing the electrodes, the electrodes must be dried and stored dry.

8.3 The cable connectors must be kept clean and must not be exposed to moisture or water.

8.4 Electrochemical electrodes will naturally deteriorate when it is stored for a long period of time, so it is recommended that they be used immediately after purchase.

9 . Trouble Shooting

9.1 If the measurement is not accurate, the main reason is that the state of the conductivity electrode has changed, so it is necessary to check whether the electrode is in good condition. Generally, it is scaling, clogging, etc. It should be maintained or replaced in time.

9.2 If the displayed value is too large, too small or no change, please check whether the electrode connection cable or electrode measurement appearance is intact.

9.3 Modbus troubleshooting.

Issues	Possible Reasons	Solutions
Modbus unresponsive	Baud rate or stop bits do not match the Modbus master device settings.	Verify that the settings match the Modbus master device , and verify that the Modbus master device parity is set to None.
	RS232 or RS485 cable is failed.	Cable replacement/repair
	There is no network offset and termination , or the network offset and termination is not appropriate.	Check the termination or offset settings of all network devices . Only the endpoints of the network should have termination turned on, and only one point on the network should provide an offset.
	The slave address is incorrect or the slave address is the same as the address of another bus device.	Verify that all addresses are unique and between 1 and 247.
Modbus responses abnormally	Registers are not supported	Verify that the registers are supported.
	Incorrect data type	Verify that the requested register data type matches the Modbus master request. For example, it is not possible to use 2-byte integer data to access some floating point type data. When requesting a floating point data (2 registers/4 bytes), both registers must be requested at the same time

10 . Warranty and Maintenance

10.1 The warranty of the company's conductivity series sensor products is for 1 year, if the product can not be used normally during the warranty period, please contact the company immediately.

10.2 After consulting with the company, you can send the failed product back, and please pack the product properly before sending it back and send back the repair card with it together.

10.3 After receiving the product, we will test the product, if the product cannot be used normally due to quality problems, we will provide free repair or replacement services;if the product can not be used

normally due to non-quality problems, the company can provide repair or replacement services for a fee.

Note: This manual applies to a variety of products in this series, please refer to the actual products. The
description of the contents of the manual with the renewal of the product changes, the company does not
notify and does not undertake the consequences arising therefrom!