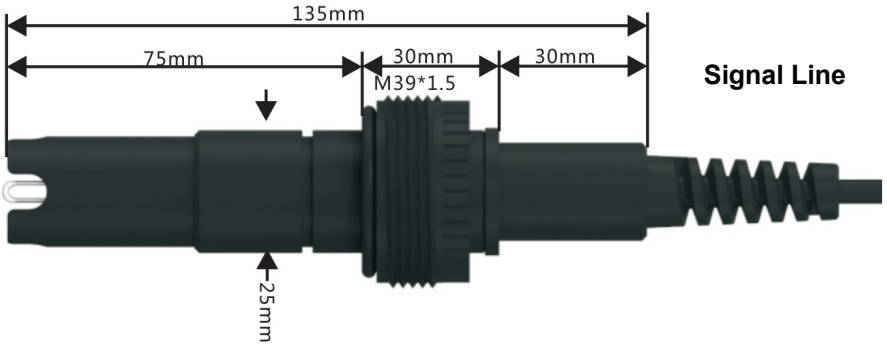
ELECTRICAL CONDUCTIVITY SENSOR (WATER QUALITY ANALYSIS)

User Manual for SRWQ100-EC103-8801



Thank you for choosing L-com product. To ensure safe, accurate performance and product longevity, please take a moment to familiarize yourself with this manual before powering the device. Please keep it handy for future reference. In case of any questions regarding the installation or use of product, please call us at 800.341.5266.

Reach out to us at customerservice@l-com.com and visit our website at www.l-com.com

M_SRWQ100-EC103-8801_05/2022_R1.0

Technical Indicators

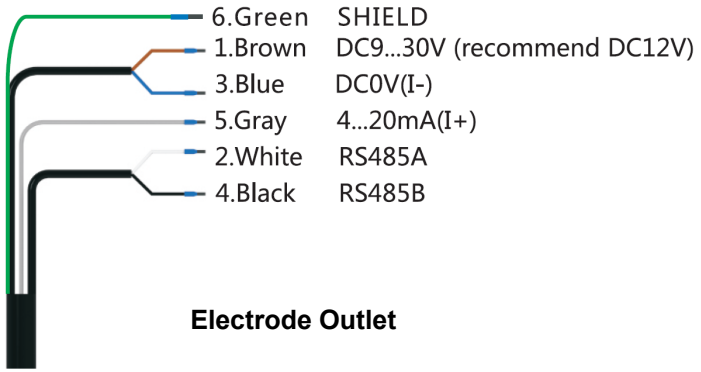
Measuring Range	0.00 – 20.00 μS/cm
Accuracy	<2%
Resolution	±1 μS/cm
Temperature Measure Range	0.0 – 60.0 ˚C
Temperature Compensation	Automatic / Manual
Output Signal	RS485, 4 – 20 mA
Shell Material	ABS, PPS
Power Supply	9 – 30 VDC (Recommend 12V)
Pressure Range	0 – 4 bar
Pipe Thread	M 39*1.5
Cable Length	5m or customized
Protection Grade	IP68

Instructions Before Use

- The EC electrode needs to be dried before storage. Do not store the electrode in distilled or deionized water.
- During the measurement process, if there is dirt, adhesive or encrust on the electrode, the measured value will be inaccurate or fluctuate. It should be cleaned and calibrated from time to time.

Electrode Wiring

- Please follow the instructions carefully, wrong wiring will damage the product completely.
- Examine all the wiring carefully in the system. Make sure wiring is complete before switching ON the power.
- It is strictly forbidden that RS485A line and RS485B line should not touch the power line. It will permanently damage the communication of the electrode.



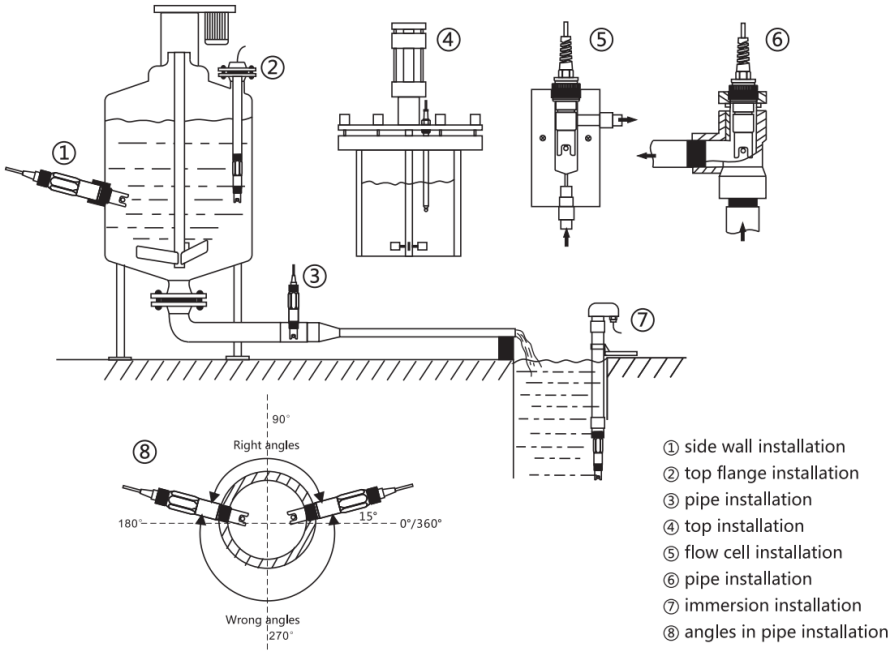
Electrode Outlet

Electrode Calibration

- The electrode has been calibrated before shipment, user can directly use it.
- In order to ensure the measurement accuracy of the conductivity meter, the conductivity constant is re-calibrated before use. For the next few measurements, the conductivity constant should be calibrated regularly. If the error is large, the electrode should be replaced on time.
- Users are recommended to calibrate the electrode every 1 to 2 months.

Electrode Installation

It is recommended Conductivity Electrode to be installed in the flow cell for more stable and accurate measurement. If electrode is installed in the pipe, the right angle should be 15°-165°.



During Immersion Installation

- During installation procedure, there will be frequent dirt on electrode, clean it regularly.
- Measuring value is not stable.
- Different insertion depths affects the measured value.
- The position of the electrode must be above the sediment.

Electrode Communication

Default Communication Instructions:

- Data starting at 0x represents hexadecimal.
- The check code is 16CRC, the low byte is in the front and the high byte is in the back.
- Floating point number occupy four bytes.

Communication Description (Factory Default):

Baud Rate	9600 (Default)
Data Bit	8
Stop Bit	1
Check Bit	No
Address	1 (Default)

Host Computer Transmission Format:

	Data Type	Description	Remarks
Integer	16-Bit Integer	The high-low bytes of word component are not reversed	Ex: O x 0032 to decimal number is 50
Floating Point Number	(CDAB) 3412	The high-low word of the double-byte component is reversed, but the high-low byte of the word is not reversed.	Example: 72 37 41 DB transfer to floating point number. CDAB change order is ABCD. Eg: 41 DB 72 37 transfer to floating point is 27.4

Function Code Description:

- This product supports 03,06,16 and other common function codes.
- The output register uses 16 function codes when writing double word data or writing multiple data in batches.

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

Read Floating Point Number »

Host Computer Transmission Format:

Eg.	ID Address	Func-tion Code	Register Start Address		Qty. Of Registers		CRC16	
			High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Byte
Conductivity Value	0x01	0x03	0x00	0x00	0x00	0x02	0x0B	0xC4
Resistivity Value	0x01	0x03	0x00	0x02	0x00	0x02	0xCB	0x65
Temperature Value	0x01	0x03	0x00	0x04	0x00	0x02	0xCA	0x85
TDS Value	0x01	0x03	0x00	0x06	0x00	0x02	0x0A	0x24
Salinity Value	0x01	0x03	0x00	0x08	0x00	0x02	0xC9	0x45

Slave Computer Response Format:

Eg.	ID Address	Func-tion Code	Qty of Bytes	Data Content				CRC16	
				C	D	A	B	High Byte	Low Byte
Conductivity Value Return	0x01	0x03	0x04	0x3E	0x95	0x89	0xC7	0xF5	0xC1
Resistivity Value Return	0x01	0x03	0x04	0x45	0x7B	0x35	0x1D	0x7F	0x48
Temperature Value Return	0x01	0x03	0x04	0x41	0x8C	0xBD	0xE0	0x3C	0x5F
TDS Value Return	0x01	0x03	0x04	0x43	0x12	0x08	0x8C	0xD7	0x49
Salinity Value Return	0x01	0x03	0x04	0x43	0x12	0x08	0x8C	0xD7	0x49

Note: 72 37 41 DB transfer to floating point number, CDAB change order is ABCD, i.e. 41 DB 72 37 transfer to floating point is 27.4.

Write Floating Point Number

Host Computer Transmission Format:

Eg.	ID	Func tion Code	Register Start Address		Qty. Of Registers		Qty Of Byte	Write Register Data in Hexadecimal Floating Point Number				CRC16	
			High Byte	Low Byte	High Byte	Low Byte		C	D	A	B	High Byte	Low Byte
Con-ductivity Con-stant	0x01	0x10	0x00	0x 12	0x00	0x 02	0x 04	0x 3F	0x 79	0x 77	0x 85	0xE4	0x48

Slave Computer Response Format:

Eg.	ID Address	Function Code	Register Start Address		Qty. Of Registers		CRC16	
			High Byte	Low Byte	High Byte	Low Byte	High Byte	Low Byte
Conductivity Constant Return	0x01	0x10	0x00	0x0A	0x00	0x02	0xCA	0x61

Write Integer

Host Computer Transmission Format:

Eg.	ID Ad-dress	Func-tion Code	Register Start Address		Register Data in Hexadecimal Integer		CRC16	
			High Byte	Low Byte	A	B	High Byte	Low Byte
Write Device Address	0x01	0x06	0x00	0x14	0x00	0x02	0x0F	0x48

Slave Computer Response Format:

Eg.	ID Ad-dress	Func-tion Code	Register Start Address		Write Register Data in Hexadecimal Integer		CRC16	
			High Byte	Low Byte	A	B	High Byte	Low Byte
Device Return Address	0x01	0x06	0x00	0x14	0x00	0x02	0x0F	0x48

Note: Change the local computer address 1 to address 2 and write the hexadecimal number 0x00 02 into register 0x 00 14.

Calibration Instructions

Start Calibration:

- Clean and dry the electrode, put it in the standard solution. Send command 01 03 00 00 00 02 C4 OB.
- After reading the stabilized measured value, calculate the conductivity constant, conductivity constant = standard solution value / current measured value.
  For eg., the electrode is placed in the 1.413mS/cm standard solution and the current measured value of the electrode is 1.450mS/cm.
  Then the conductivity constant = 1.413/1.450=0.97448.
- To write data to the 0x0A register 0.97448.
- Send command: 0110 00 QA 00 02 04 77 85 3F 79 A9 9F.

Order Description for Floating Point Number Hexadecimal:

- Change the floating point number in hexadecimal order.
- The 0x32 register writes data 0, and the floating point order is 1234 (i.e. ABCD). The 0x32 register writes data 1, and the floating point order is 3412 (CDAB). For eg.: change the electrode floating point order to 1234, the command is as follows 01 06 00 32 00 00 28 05.

Note: When the floating point number is changed to 3412 in hexadecimal order, the read and write is also 3412.

- Change the electrode floating point order to 3412, the command is as follows 010600320001E9C

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

Address Description

Name	Data Address	Data Type	Length	Read/ Write	Description
Conductivity Value	00x 00 00	Floating Point	2	Read	The default unit is mS/cm. If it needs to be converted to uS/cm, multiply by 1000
Resistivity Value	0x 00 02	Floating Point	2	Read	Ω cm
Temperature	0x 00 04	Floating Point	2	Read	°C
TDS	0x 00 06	Floating Point	2	Read/ Write	ppm or mg/L
Salinity	0x 00 08	Floating Point	2	Read/ Write	ppm or mg/L
Conductivity Constant	0X 00 0A	Floating Point	2	Read/ Write	
Compensation Coefficient	0x 00 0C	Floating Point	2	Read/ Write	
Manual Compensation Temperature	0X 00 0E	Floating Point	2	Read/ Write	
Temperature Offset	0x 00 10	Floating Point	2	Read/ Write	
Baud Rate	0x 00 12	Floating Point	2	Read	
Slave Address	0x 00 14	Floating Point	2	Read	
Filtered Seconds	0x 00 16	Floating Point	2	Read	
Electrode Sensitivity	0x 00 18	Floating Point	2	Read	
Compensation Mode	0X 00 1A	Floating Point	2	Read	
Model Compensation Type	0X 00 1C	Floating Point	2	Read	950.0-PT1000, 950.1-NTC1OK
4-20mA High Point Value	0x 00 20	Floating Point	2	Read	

Name	Data Address	Data Type	Length	Read/ Write	Description
Modify Baud Rate	0x 00 12	Integer	1	Write	2400,4800,9600,19200 38400,43000,57600
Modify Slave Address	0x 00 14	Integer	1	Write	1-254
Modify Filter Seconds	0x 00 16	Integer	1	Write	Second value
Modify Compensation Mode	0X 00 1A	Integer	1	Write	0: automatic, 1: manual
Adjust Float Order	0x 00 32	Integer	1	Write	0 : positive, 1: negative
Modify Temperature Compensation Type	0x 00 33	Integer	1	Write	0: PT1000, 1: NTC10K
Restore Default	0x 00 64	Integer	1	Write	1
Restore Baud Rate And Address	0X 27 0F	Integer	1	Write	1
Modify 4-20mA High Point Value	0x 00 12	Floating Point	2	Write	

Common Instruction Examples »

Sr. No.	Function	Send Command	Return Command	Remarks
1	Read conductivity value	010300000002C40B	0103043E958 9C7C1F5	Convert 3E9589C7 to floating point 0.292
2	Read resistivity value	01030002000265CB	010304457B3 51D487F	Convert 457B3510 to floating point 4019.3
3	Read temperature	01030004000285CA	010304418CB DE05F3C	Convert 418CBDE0 to floating point 17.59
4	Read TDS	010300060002240A	010304431208 8C49D7	Convert 4312088C to floating point 146.03
5	Read salinity	01030008000245C9	010304431208 8C49D7	Convert 4312088 to floating point 146.03
6	Write conductivity constant	0110000A0002043F8 CCCCD2ABA	0110000A000 261CA	Convert 3F8CCCCD to floating point 1.100
7	Write compensation coefficient	0110000C0002043C A3D70AD07F	0110000C000 281CB	Convert 3CA3O70A to floating point 0.02
8	Write manual compensation temperature	0110000E00020441A 00000663D	0110000E000 2200B	Convert 41A00000 to floating point 20.0
9	Write temperature offset	011000100002043F8 00000FF5F	011000100002 400D	Convert 3F800000 to floating point 1
10	Read baud rate	010300120002640E	010304461600 000EBF	Convert 46160000 to floating point 9600
11	Read slave address	010300140002840F	0103043F8000 00F7CF	Convert 3F800000 to floating point 1
12	Read Compensation mode	0103001A0002E5CC	0103043F8000 00F7CF	Convert 3F800000 to floating point 1 is automatic
13	Read model Compensation type	0103001C000205CD	010304424866 66C5D7	Convert 42486666 to floating point 50.1
14	Read 4-20mA high point value	010300200002C5C1	010304459C4 0001ED1	Convert 459C4000 to floating point 5000
15	Write baud rate	0106001209602FB7	010600120960 2FB7	Modified to 2400

Sr. No.	Function	Send Command	Return Command	Remarks
16	Write slave address	010600140002480F	010600140002480F	Modified to 2
17	Write compensation mode	0106001A000169CD	0106001A000169CD	Modified to automatic
18	Write adjust float order	010600320001E9C5	010600320001E9C5	Modified to CDAB (ie 3412)
19	Write restore default	01060064000109D5	010600640001 09D5	Write 1 to confirm
20	Write restore baud rate and address	0106270F000172BD	0106270F0001 72BD	Write 1 to confirm
21	Write modify 4-20mA high point value	01100012000204412 00000668C	011000120002 E1CD	Modified to 10

Maintenance And Storage

- The organic dirt on the electrode should be cleaned with warm water containing detergent or alcohol. After cleaning the electrode, it should be dried by soft tissue.
- When the electrode is stored, it shall be dried.
- Cable connector must be kept clean, dry, free from moisture, water, acids, alkalis etc.

Troubleshooting

- When the measurement is inaccurate, its mainly because the conductivity electrode has changed, so check whether the conductivity electrode is in good condition or not. If the bubble is damaged, replace it.
- If the value of the instrument is too large, too small or no change, check whether the electrode is in good connection with the instrument.

MODBUS Troubleshooting

Problem	Possible reason	Solution
Modbus no response	The baud rate, or stop bit does not match the Modbus master settings	Verify that the settings match the Modbus master device settings, and verify that the Modbus master device parity check is set to None.
	Rs232 or RS485 cable is faulty	Replace/repair cables.
	No network offsets and termina-tions, or network offsets and terminations are not suitable.	Check the termination or offset Settings for all network devices. Only the endpoints of the network should be turned on and terminated, and there should be only a point on the network to 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 are between 1 and 247.
Modbus abnormal response	Register not supported	Verify that the register is supported
	Incorrect data type	Verify that the requested register data type matches the Mod bus master device request. For eg., user cannot access a floating point data using 2-byte integer data. When a floating point data (2 registers/ 4 bytes) is requested, two registers must be requested at the same time.