

SJG-2083CS

Online Acid-base Concentration Analyzer

User Manual



Shanghai BOQU Instrument Co., Ltd.

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Introduction

The SJG-2083CS industrial online acid-base concentration meter is a brand-new online intelligent digital meter independently developed and manufactured by Shanghai BOQU. It covers the measurement of various solutions like electrical conductivity, sodium chloride, hydrochloric acid, nitric acid, sodium hydroxide and dilute/concentrated sulfuric acid.

This instrument communicates with the sensor through RS485 (ModbusRTU), which has the characteristics of rapid communication and accurate data.

Complete functions, stable performance, easy operation, low power consumption, safety and reliability are the outstanding advantages of this instrument.

This meter uses matching digital acid-base concentration electrode, which can be widely used in thermal power generation, chemical industry, ion exchange method to produce high-purity water in the process of regenerating liquid concentration, or used to configure boiler pipe pickling liquid, to control the acid-base salt concentration in the solution Continuous monitoring.

Technical Features

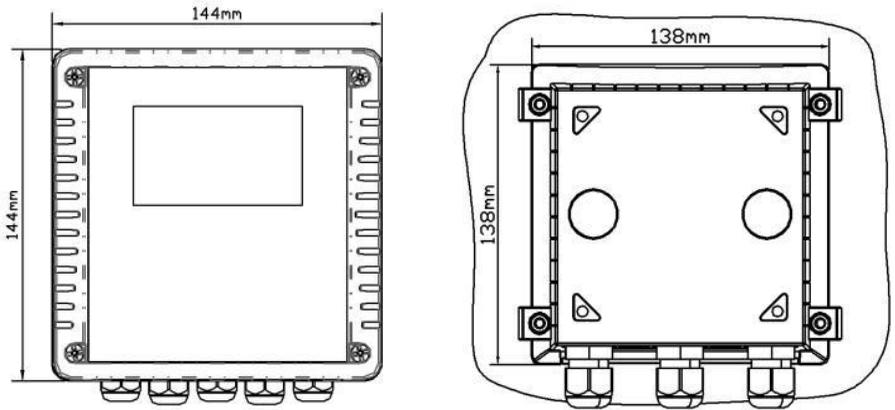
- 1) Extremely quickly and precision Acid-base concentration sensor.
- 2) It's suitable for harsh application and free-maintenance,save cost.
- 3) Provide two tunnels of 4-20mA output for Acid-base concentration and temperature.
- 4) Digital Acid-base concentration Sensor provide precision and online measurement.
- 5) With data recording function,user easy to check history data and historycurve.

Technical Specification

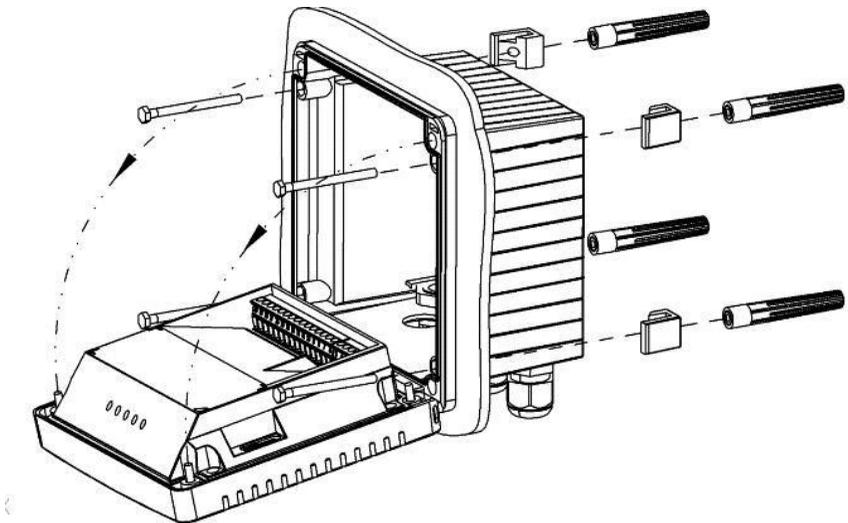
Specifications	Details
Name	Online Acid-base Concentration Analyzer
Shell	ABS plastic
Power Supply	90V – 260V AC 50/60Hz
Output	Two 4-20mA output tunnels,RS485
Relay	5A/250V AC 5A/30V DC
Size	144mm×144mm×104mm
Weight	0.9kg
Protocol	Modbus RTU
Range	0.00mS/cm~2000.00 mS/cm 0.00%~25.00% <i>NaCl</i> 0.00%~17.98% / 20.01%~39.07% <i>HCl</i> 0.00%~30.00% / 35.01%~96.00% <i>HN0₃</i> 0.00%~25.99% / 15.13%~50.00% <i>NaOH</i> 0.00%~30.25% / 91.91%~100.00% <i>H₂S0₄</i> -40°C~100°C (depends on sensor)
Accuracy	±0.1%FS ±0.5°C
Waterproof Level	IP65

Installation and Wiring

Size

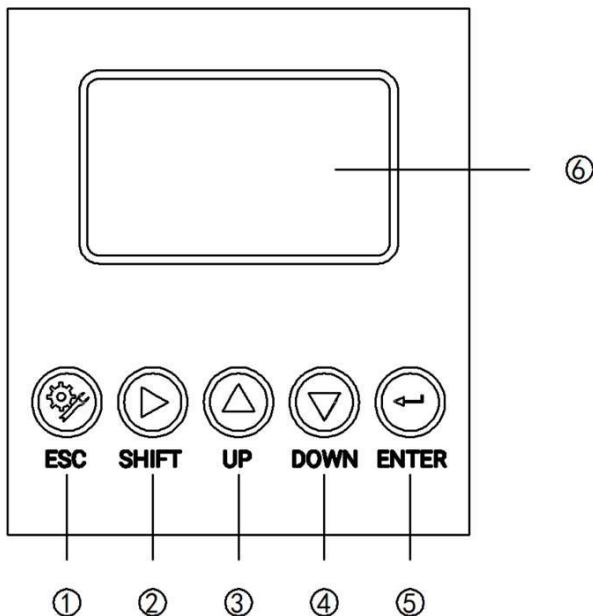


Installation



Operation Interface

There are 2 modules in the main panel of the Acid-base concentration measuring instrument, LED LCD display module and button module. Users can set and adjust the parameters of the instrument through the 5 buttons on the panel.



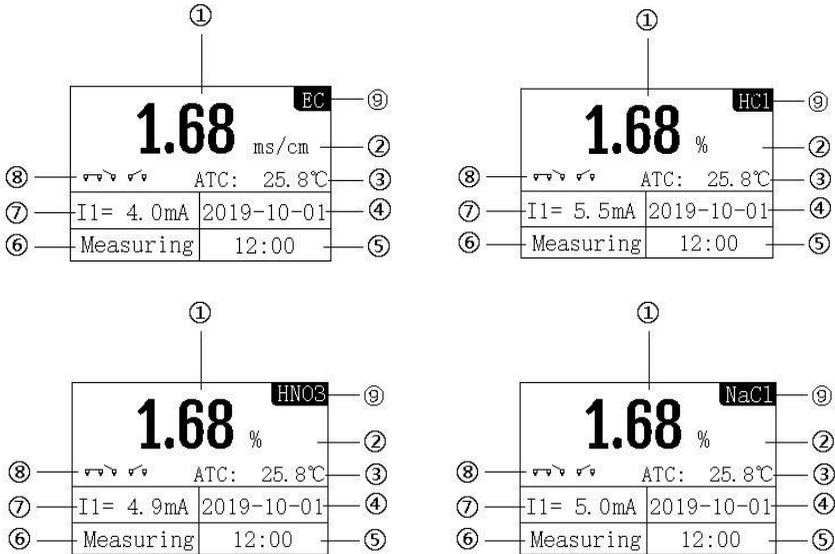
Picture 1 Operation Interface

- ① Set/Exit button
- ② Select/Shift button
- ③ Up button
- ④ Down button
- ⑤ Confirm button
- ⑥ LED screen

Measurement interface

Enter the main measurement interface after the start-up animation.

When the instrument is working normally, the LED display shows the following content.



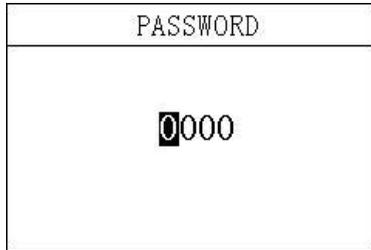
Picture 2 Main interface

- ① Measurement value
- ② Unit
- ③ Temperature
- ④ Real-time date
- ⑤ Real time
- ⑥ Measurement status
- ⑦ 4-20mA corresponding value of dissolved oxygen
- ⑧ Relay status
- ⑨ Measure mode

Setting

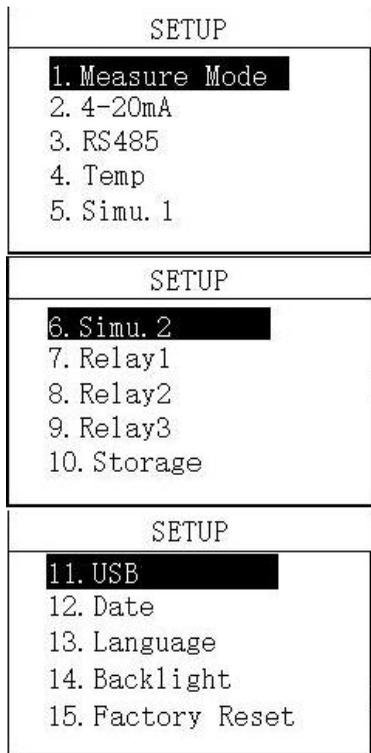
Press "Set/Exit Button" to enter the password input interface.

Enter settings:



Picture 3 Password

Enter the password "3700" to enter the setup menu.



Picture 4 Setting Menu

3.1 Measure Mode

In this menu, users can change the measurement mode.

After confirming the measurement mode, select the measurement unit for that mode.

Measure Mode	HC1
▶ mS/cm	Conc: ▶ 0-18% (25°C)
HC1 NaCl	22-39% (25°C)
HN03 NaOH	
H2SO4 Custom	

Picture 3.1 Measure Mode

3.2 4-20mA

In this menu, users can change the corresponding value of 4-20mA and set the corresponding effective range.

Unit setting is referred to 3.1.

4-20mA
4mA : 0000 ms/cm
20mA : 0009 ms/cm
4mA : +000 °C
20mA : +100 °C

4-20mA
4mA : 000%
20mA : 000%
4mA : +000 °C
20mA : +100 °C

Picture 3.2 4-20mA

3.3 ModbusRTU communication

In this menu, users can change the communication address and rate.

Modbus RTU
Address : 003
B. R. : 4800 bps
▶ 9600 bps
19200 bps

Picture 3.3 ModbusRTU communication

3.4 Temperature

In this menu, users can manually set the temperature.

Temp
MTC : +025.0°C

Picture 3.4 Temperature

3.5 Simulation

In this menu, users can simulate the 4-20mA current output. The current output can be verified by simulating the measurement of the IO1 (measured value) and IO2 (temperature) ports. The release relay is closed. The relay is simulated and verified.

Simulation1
Current1: 04.00mA
Current2: 04.00mA
Relay1: ON
▶ OFF

Picture 3.5.1 Simulation1

Simulation2	
Relay2 :	ON
	▶ OFF
Relay3 :	ON
	▶ OFF

Picture 3.5.2 Simulation2

3.6 Relay1

In this menu, users can switch the relay 1 function, set the parameter alarm upper limit value, alarm return difference value, and alarm delay time.

Relay1	Relay1
Func. : ON	Func. : ON
▶ OFF	▶ OFF
High : 0100 ms/cm	High : 000 %
Hyst : 000 ms/cm	Hyst : 00 %
Delay : 030 S	Delay : 030 S

Picture 3.6 Relay1

3.7 Relay2

In this menu, users can switch the relay 2 function, set the parameter alarm lower limit value, alarm return difference value, and alarm delay time.

Relay2	Relay2
Func. : ON	Func. : ON
▶ OFF	▶ OFF
Low : 0001 ms/cm	Low : 000 %
Hyst : 000 ms/cm	Hyst : 00 %
Delay : 030 S	Delay : 030 S

Picture 3.7 Relay2

3.8 Relay3

In this menu, users can set the relay 3 function, set the cleaning time and cleaning cycle.

Relay3	
Func. :	ON ▶ OFF
Period :	001.0H
Clean :	010s

Picture 3.8 Relay3

3.9 Storage

In this menu, users can set the storage function (default on), clear storage memory and recording interval.

Storage	
Switch :	ON ▶ OFF
Clear :	YES ▶ NO
Interval :	005 min

Picture 3.9 Storage

3.10 Date&Time

In this menu, users can change date and time according to different time zone.

Date	
Y-M-D :	2019-10-01
H:M:S :	12:00:00

Picture 3.10 Date&Time

3.11 Language

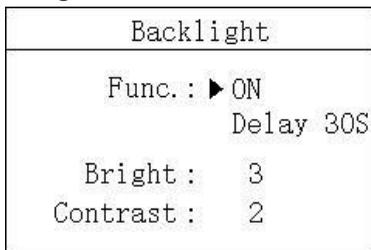
Users can choose English or Chinese according to need.



Picture 3.11 Language

3.12 Backlight

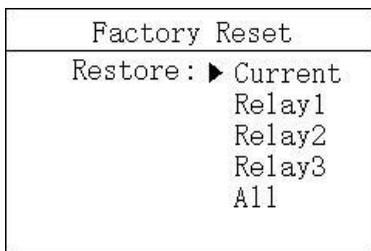
In this menu, users can change the backlight mode of the LCD screen. The backlight can be always on or delayed off (the default is delayed off), the backlight brightness can be changed (brightness level 1-5, brightness increases), and the contrast can be changed.



Picture 3.12 Backlight

3.13 Factory data reset

In this menu, users can restore the current output and relay to the factory parameters.



Picture 3.13 Factory data reset

Calibration

Press "ESC" to enter the password input interface.

Enter calibration menu:

PASSWORD
0000

Picture 5 Password

Enter the password "3900" to enter the calibration menu.

CALIBRATION
1. Param Set
2. Cell Constant
3. Density Cal
4. Factory Reset

Picture 6 Calibration menu

4.1 Parameter Set

In this menu, users can manually modify the reference temperature and temperature coefficient.

Param Set
Refer Temp : ▶ 25°C
20°C
Temp Coef. : 00.0%

Picture 4.1 Parameter Set

4.2 Cell Constant

In this menu, users can modify the electrode value to the current electrode value.

Cell Constant
Number : 00.000
Please Press Enter

Picture 4.2 Cell Constant

4.3 Density Calibration

In this menu, users can manually modify the known solution density to the current measurement parameter.

Density Cal		Density Cal NaCl	
26.26 mS/cm 25.6°C	0000.00 mS/cm	26.26 % 25.6°C	000.00 %
Please Press Enter		Please Press Enter	

Picture 4.3 Density Calibration

4.4 Factory data reset

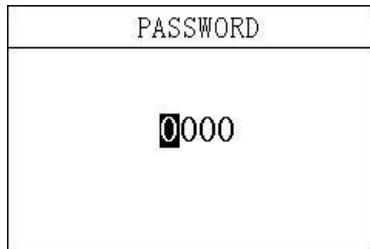
In this menu, users can restore the calibration parameters to the factory parameters.

Factory Reset
▶ YES
NO

Picture 4.4 Factory data reset

History Data Display

Press "ESC" to enter the password input interface.



Picture 7 Password

Enter History Data Display:

Enter the password "1300" to enter the History Data Display.

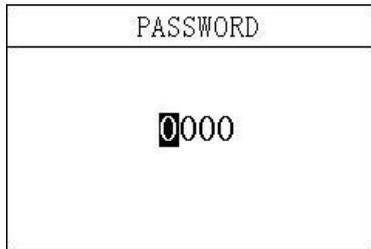
Press the up and down keys to switch the display. It can store up to 1000 records and overwrite automatically if reach maximum.

Record	1/1000
2020-01-09 12:48:28	
6.00 ms/cm 25.6°C	
2020-01-09 12:43:28	
6.00 ms/cm 25.6°C	
2020-01-09 12:38:28	
6.00 ms/cm 25.6°C	
2020-01-09 12:33:28	
6.00 ms/cm 25.6°C	

Picture 8 History

Waveform Display

Press "ESC" to enter the password input interface.

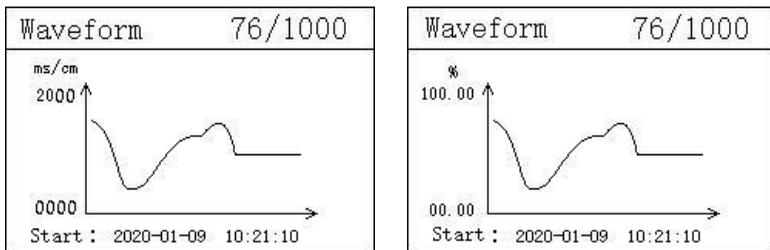


Picture 9 Password

Enter Waveform Display:

Enter the password "1400" to enter the Waveform Display.

Press the up and down keys to switch the display.



Picture 10 Waveform Display

Appendix

Communication protocol

Communication parameters:

Baudrate:4800, 9600, 19200(9600default)

Serial data format: 8N1(8 data bits, No parity, 1 stop bit)

Function code: 03

Device address: Acid-base concentration analyzer defaults to 2

Register definition:

Register address(Dec)	Definition	R/W	Remarks
0, 1	Temp	R	×1.0 °C, FP32 AB CD
2, 3	Density	R	×1.0 %, FP32 AB CD
8	RTU Address	R/W	Modbus communication address, Acid-base concentration defaults 2.
9	Baudrate	R/W	4800, 9600, 19200, 9600 as default
16, 17	EC without temp	R	×1.0 mS/cm, FP32 CD AB
18, 19	EC with temp	R	×1.0 mS/cm, FP32 AB CD

Examples of communication formats:

Data reading instruction

Addr. + Func. + Register start address + Number of Registers read + CRC check code (Hex)

e.g. Tx:02 03 00 02 00 02 65 F8

Address	Func.	Register start address	Number of Registers read	CRC check code
02	03	0002	0002	65F8

Data return instruction:

Address + Func. + Data length + Data + CRC check code (Hex)

e.g. Rx:02 03 04 40 0E B8 52 4E CD

Address	Func.	Data length	DO value	CRC check code
02	03	04	400EB852	4ECD

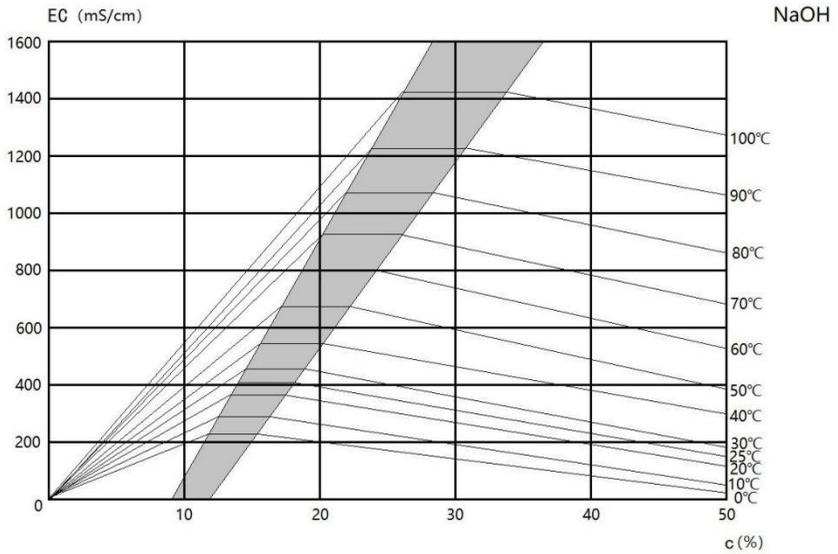
Convert the hexadecimal number 400EB852 to decimal through a floating-point number converter, resulting in a value of 2.23

HEX To DEC	
HEX :	400EB852
	\$40\$0E\$B8\$52
DEC :	2.23000001907349

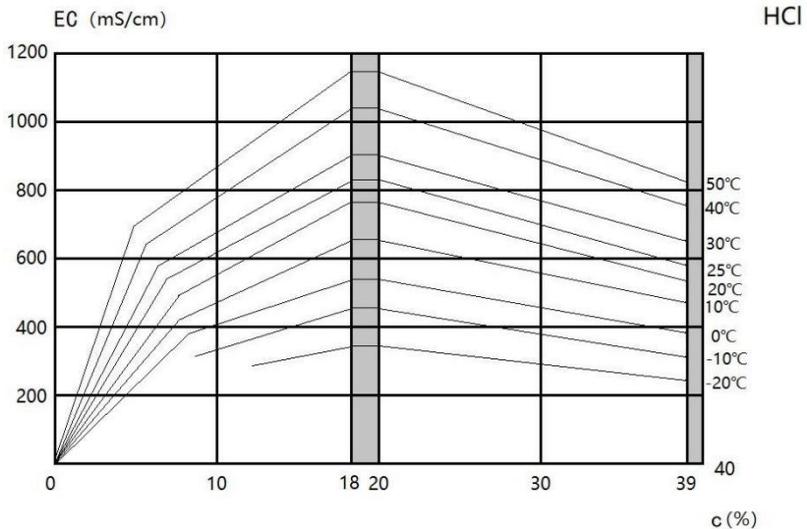
Reference curve for concentration

NOTICE: Concentration measurement is not possible in shadowed range.

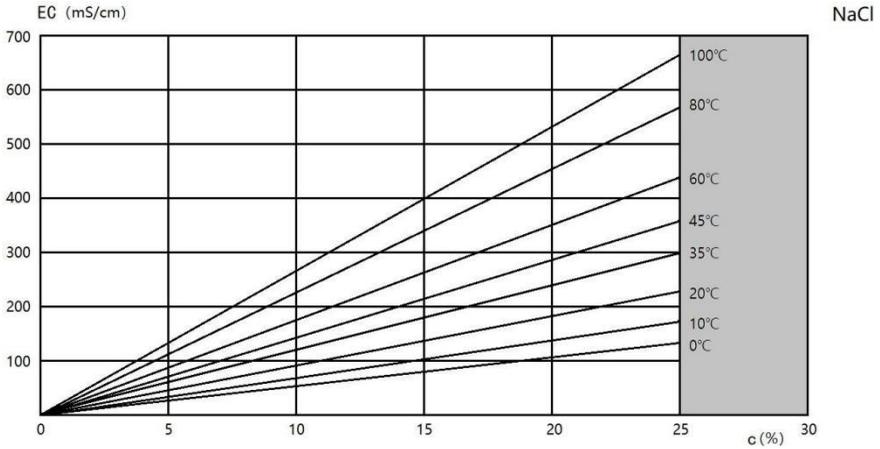
NaOH



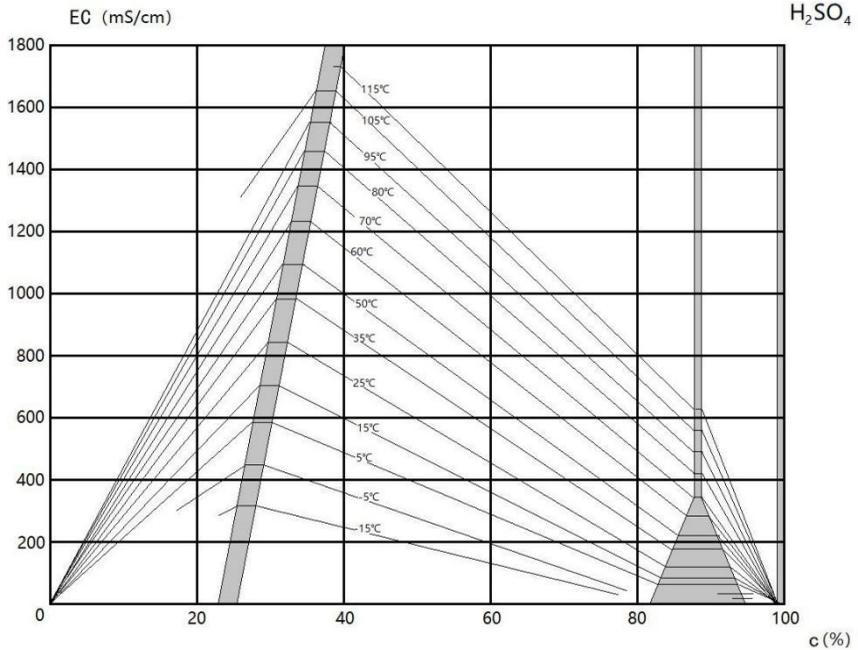
HCl



NaCl

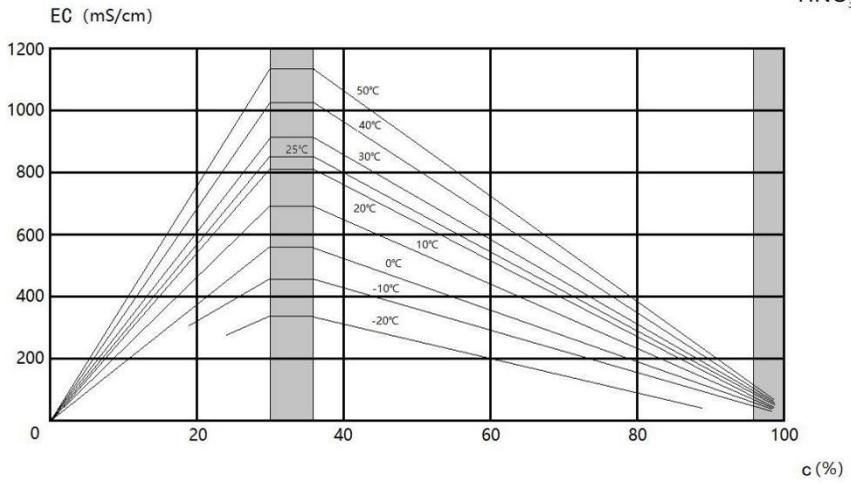


H₂SO₄



HNO₃

HNO₃



Custom

Custom
▶ Four Point Two Point

There are two modes of custom interval measurement, namely variable temperature four-point mode and constant temperature two-point mode.

1. Four points

Conc Choose
▶ Low Conc High Conc

After entering the 'Four Point' option, the 'Low Conc' and 'High Conc' option appear. First select the 'Low Conc' option and adjust the range as needed. (Note: Only the range within a one-sided interval is supported. See followed figure for the graph. The left or right side of the shadow is a separate interval and cannot be set across intervals)

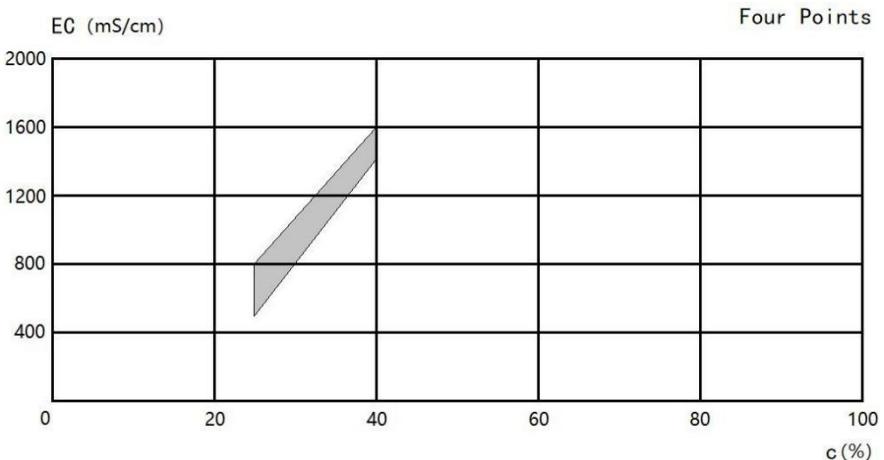
Low Conc
Conc : 10.0 % Low : 010.0 °C Cond1 : 0100.0 mS/cm High : 025.0 °C Cond2 : 0500.0 mS/cm

Set 'High Conc' after setting 'Low Conc'. (High and low concentration must be set)

High Conc
Conc : 20.0 %
Low : 10.0 °C
Cond1 : 1000.0 mS/cm
High : 25.0 °C
Cond2 : 1500.0 mS/cm

The setting is the same as 'Low Conc', the temperature has been set at 'Low Conc', and 'High Conc' does not need to be set again.

Take low concentration of 25%, low temperature of 10°C, conductivity1 of 500 uS/cm, high concentration of 40%, high temperature of 25°C, conductivity2 of 800 uS/cm, high concentration of 40%, conductivity1 of 1400 uS/cm, and conductivity2 of 1600 uS/cm as examples. One concentration corresponds to two temperature values and two conductivity values, that is, a total of four points in the coordinate system.



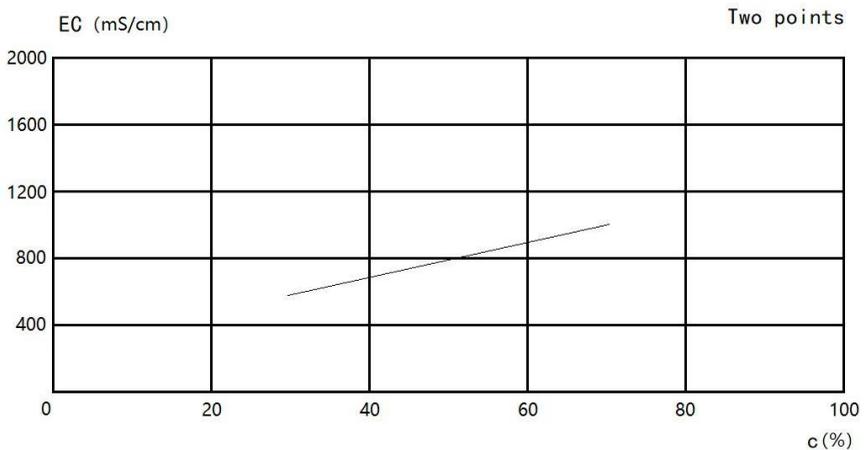
It can be clearly seen from the above figure that connecting the four points in the data, the shaded part of the quadrilateral is the data range given in the example. Then upper side is the 25°C isotherm and the lower side is the 10°C isotherm.

2. Two points

Two Point
Low : 10.0 %
Cond1 : 1000.0 mS/cm
High : 25.0 %
Cond2 : 1500.0 mS/cm

'Two Point' only need to set the high and low concentration value and its corresponding conductivity value. The measurement environment must be a constant temperature environment.

Take low concentration 30%, conductivity1 600 mS/cm, high concentration 70%, conductivity2 1000mS/cm as examples. Due to constant temperature conditions, there are only two points in the coordinate system, so the figure is a straight line.



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