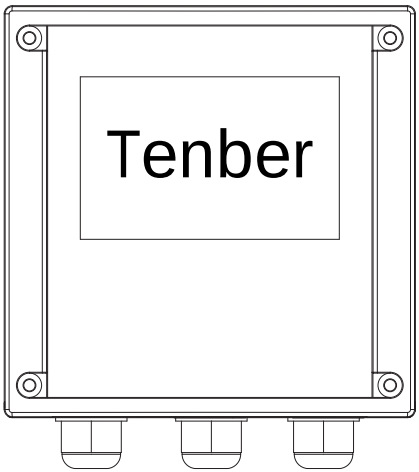
Inductive Conductivity Controller

Acid-Base Concentration Meter



ECS-7308

Contents

Safe Operation---------- 2
Instrument Use---------- 2
Product Content and Warranty---------- 2
Specification ----------3
Instrument Installation---------- 4
Wiring label---------- 6
Electrode Wiring Diagram---------- 6
Relay Contact Protection Figure---------- 7
Show instructions---------- 8
Key Description---------- 11
Hold Mode---------- 11
Measurement settings---------- 12
Output settings ----------12
Relay settings ----------13
Profile Logging Settings ----------14
Output test ----------16
Correction ----------16
Date Setting---------- 18
Language settings---------- 18
Backlight Settings---------- 18
Version ----------19
Factory reset---------- 20
Factory default---------- 21
Password ----------21
Error Code---------- 21
RS485 Communications ----------22

Safe Operation

Please read the following instructions for safe operation in detail before use

1. Before use, check the instrument for damage during transport.
2. Operation is restricted to trained personnel.
3. Read this manual before use. Incorrect wiring may cause injury or damage.
4. Check all wiring and connected equipment before switching on the power.
5. Avoid high temperature, humidity, corrosive environments, and direct sunlight.
6. Avoid surge interference. If present, isolate the instrument power supply from other equipment.

Intended Use

Measures conductivity, salinity, and acid/alkali concentration.

Panel, wall, or pipe mounting.

Two current outputs; maximum load: 500 ohm.

Three control relays, rated 5 A at 250 VAC or 5 A at 30 VDC.

Package Contents and Warranty

Package: one instrument and four mounting bracket sets (screws, retaining blocks, and rods).

Specifications

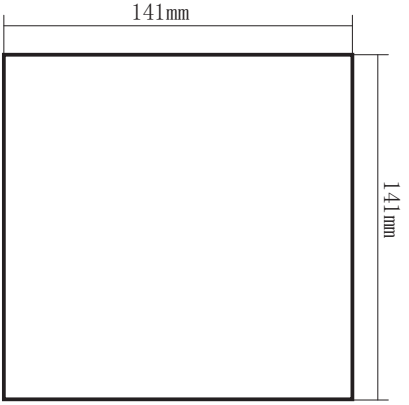
	Inductive conductivity / acid-alkali concentration meter
Conductivity range	0-2000mS/cm (customizable)
Conductivity accuracy	±0.5%F.S.
Conductivity resolution	±0.1%F.S
Salinity range	0-30g/Kg
Salinity accuracy	±0.1g/Kg
Salinity resolution	±0.01g/Kg
Acid/alkali range	HCl: 0-40%; HNO3: 0-25% H2SO4: 0-100%; NaOH: 0-40%
Acid/alkali accuracy	±2%F.S.
Acid/alkali resolution	±0.1%F.S.
Temp.	0-120℃
Temp.	±0.1℃
Temp.	0.1℃
Temp.	PT1000
Instrument temperature range	Operating: 0 to +70 deg C; storage: -20 to +70 deg C
Maximum flow rate	3 m/s
Operating / storage temperature	-20 to +70 deg C
Display	Backlit color LCD
Conductivity current output 1	Isolated 4-20 mA; max. load 500 ohm
Temp.	Isolated 4-20 mA; max. load 500 ohm
Current output accuracy	±0.05mA
RS485	Modbus RTU
Baud rate	9600/19200/38400
Relay contact rating	5A/250VAC, 5A/30VDC
Cleaning settings	ON: 1-1000 s; OFF: 0.1-1000.0 h
Multifunction relay	Cleaning / periodic alarm / error alarm
Relay delay	0-120 s
Data logging	500,000 records
Language	Simplified Chinese / English
USB interface	Record download and software update
Protection Rating	IP65
Power Supply	220 VAC; <7 W
Installation	Panel / wall / pipe mounting
Instrument dimensions	144mmX144mmX105mm(H/W/D)

Instrument Installation

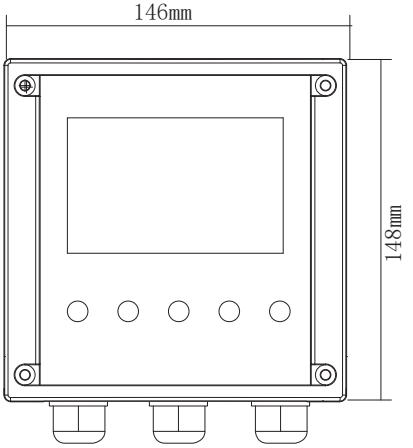
Instruments can be panel mounted, tubular mounted, wall mounted

Panel mounting: open a 141mmx141mm square hole in the distribution box panel, place the instrument from the front of the distribution box panel,

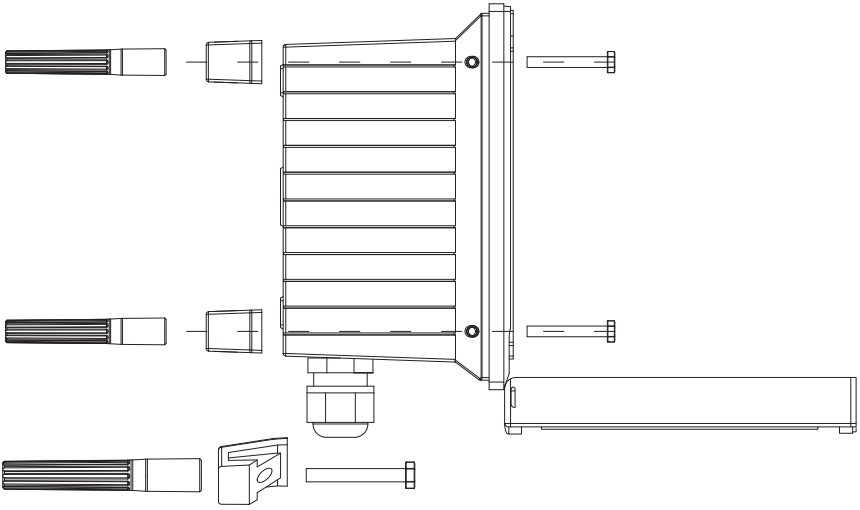
Insert the screws from the rear cover and lock the fixing block and the fixing rod from the rear of the distribution box panel



Hole Size



Panel Dimensions Drawing



Bracket installation drawing

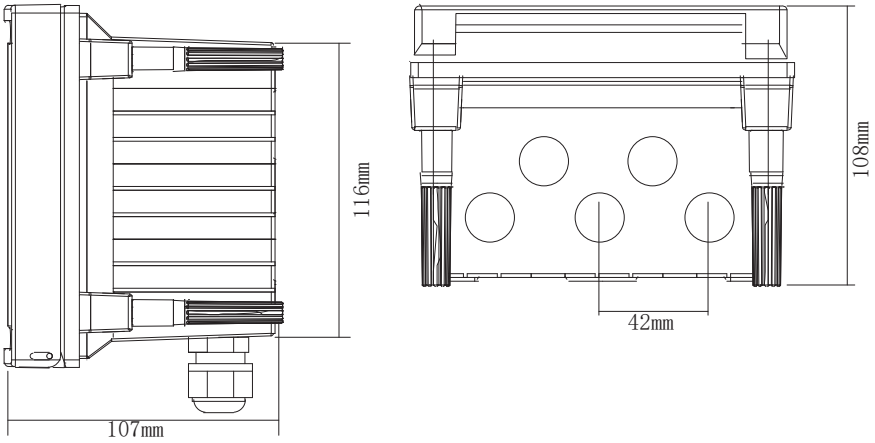
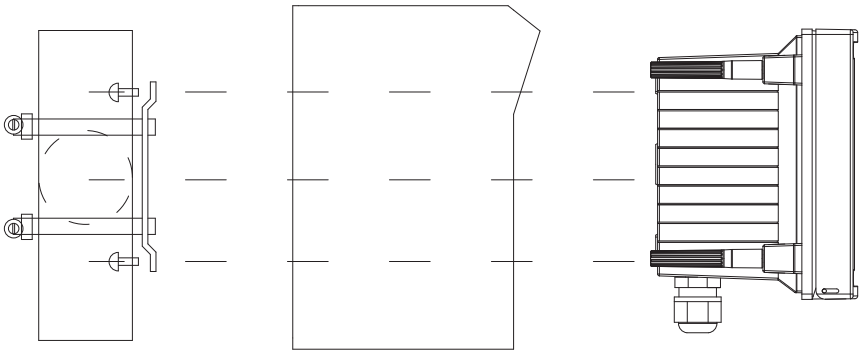
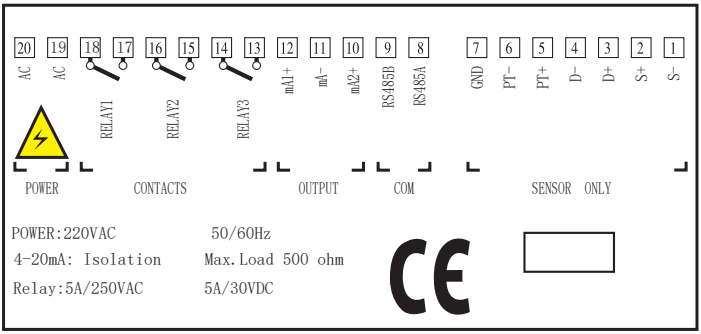


Diagram of Outline Dimensions

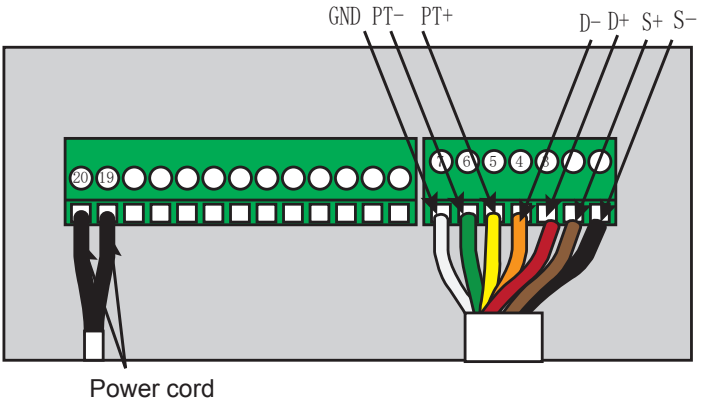


Wall & Pipeline Installation

Terminal Labels

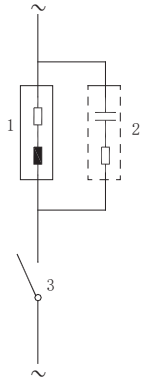


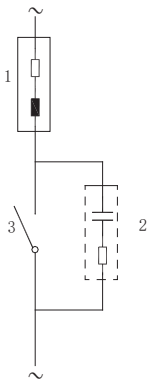
Electrode wiring diagram



Relay Contact Protection Diagram

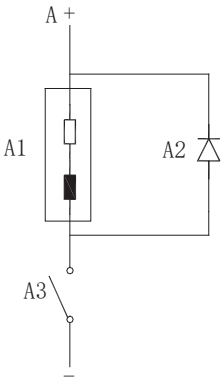
Sparking at relay contacts shortens service life, especially with inductive or capacitive loads.
Use an RC snubber to suppress arcing and extend relay life.

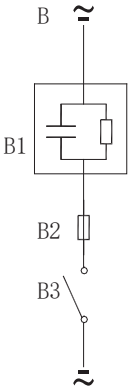


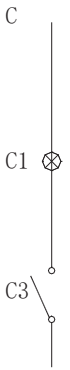


AC protection for inductive loads

1. Load
2. RC snubber for 220 VAC: R = 10 ohm, 1 W; C = 0.1630 V.
3. Relay contacts

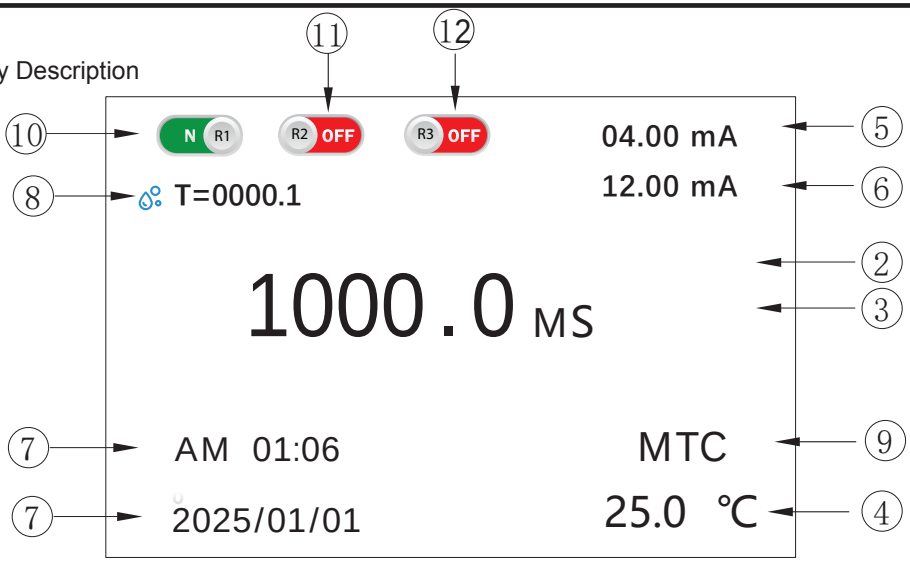






A DC protection, A1: inductive load A2: 1N4007, A3: relay contact
BAC/DC protection, B1: Capacitive load, B2: 0.8 ohm/1 watt (at DC 24V), B3: Relay contact
C resistive load, C1: bulb, C3: relay contact

Display Description



2. Main display
3 Constant
4. Temperature and Units
5. First path current
6. Second path current
7. Measurement mode, date and time
8. Countdown: cycle time/cleaning time, when there is a delay in relay 3, Delay will be displayed
9. Temperature compensation
10. Relay 1 status indication
11. Relay 2 status indication
12. Relay 3 status indication



SET CAL UP DOWN ENTER

Key	Measurement	Settings	Calibration	Records
	Open password screen	Exit	Exit	Exit
CAL	Enter calibration	Move cursor	Move cursor	Move cursor
UP	Open records	Increase value	Increase value	Increase value
DOWN	None	Decrease value	Decrease value	Decrease value
ENTER	Toggle backlight	Confirm	Confirm	Confirm

Hold Mode

Hold mode is a safe mode, mainly used for calibration mode, setting mode, recording viewing mode and relay Cleaning mode, in the holding mode, the relay is on (not working), the current is set according to the setting (fixed current/maximum rear current), and the measurement display value is fixed and unchanged.

When the above four modes are entered, the hold mode is entered.

When leaving the above four modes and returning to the measurement mode, it takes about 10 seconds to leave the holding mode.

After the instrument is turned on, it will enter the hold mode, and it will take about 10 seconds to leave the hold mode and enter the measurement mode.

Output current in hold mode: there are two modes to choose from

Fixed Current Output

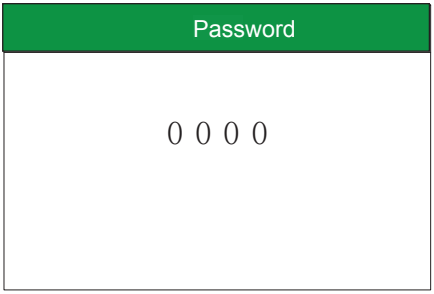
Last Current Output

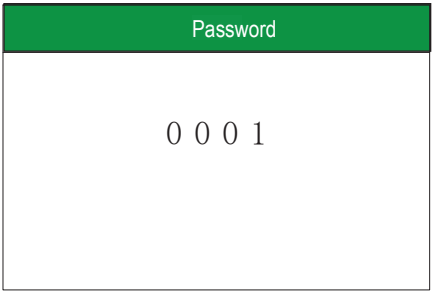
- Fixed Current: set the hold output from 4.00 to 20.00 mA.
- Last Current: hold the last measured output current.
- In Hold Mode, all relays are open (inactive).

Settings

Press the set key, use the UP/down key and the shift key. After entering the password 0001, press the enter key to enter the settings.

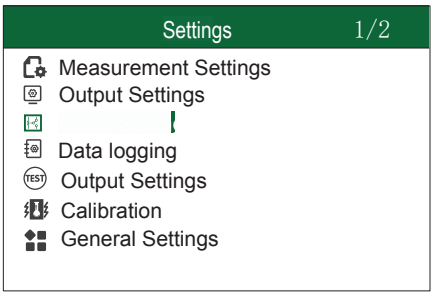
You can also press the set key to leave, and if the key is not pressed for more than 10 minutes, it will automatically return to the measurement mode.



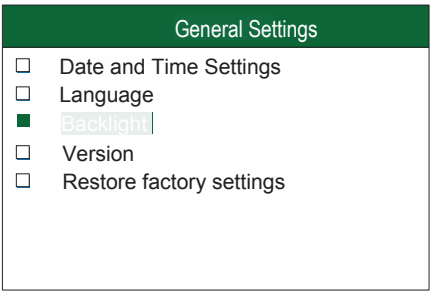


Main Screen

Press the UP/down key to select the function, and press the enter key to enter the function settings:



Page 1

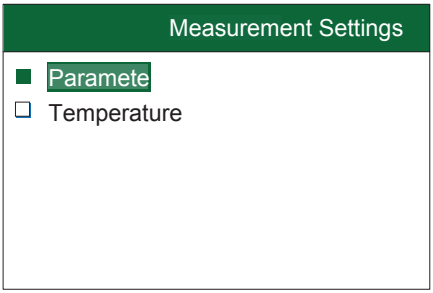


Page 2

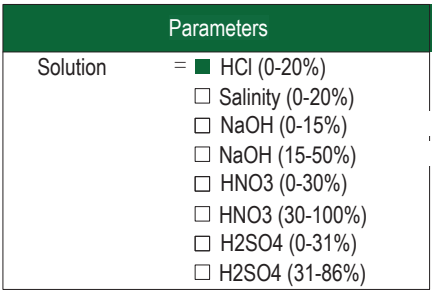
Remarks:

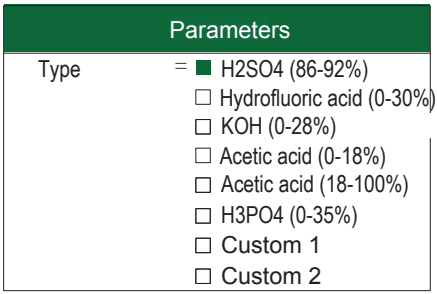
1. When setting, when the input value is not within the specified range, "error" will appear at the top of the display;
2. After entering the value, press the Enter key to save it;
3. When setting, you can press the set key to leave at any time;
4. In setup mode, if the button is not pressed for more than 10 minutes, it will automatically return to measurement mode.

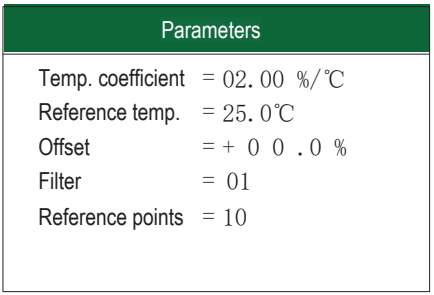
Measurement Settings



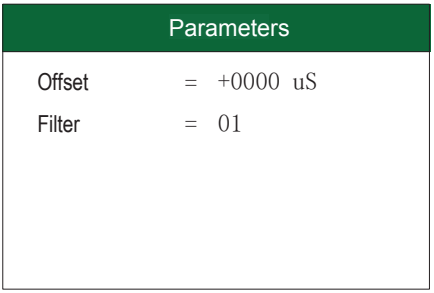
Concentration



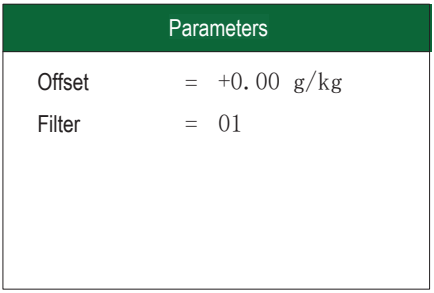




Conductivity

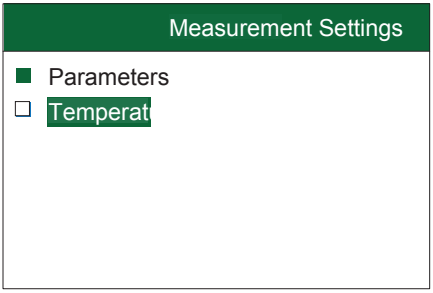


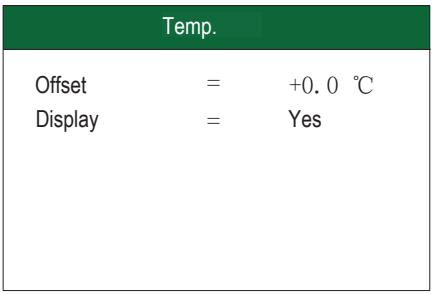
Salinity



1. Measurement type selection, press the UP/down key to select, optional conductivity/salinity/concentration
2. Offset input, range +/- 100mS, +/- 1.00 g/Kg +/- 10.0%
3. Filter Settings: Range 0-10

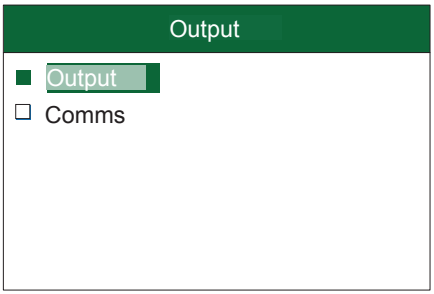
Explanation: When the reading is found to be unstable, you can try to adjust the filter value appropriately, but it will also change the reading value at the same time.
Slow degradation.

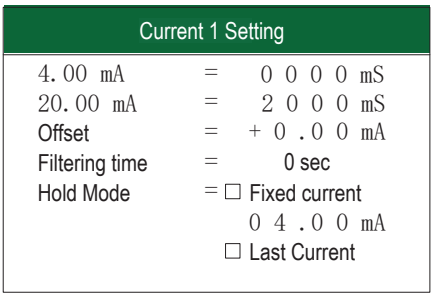


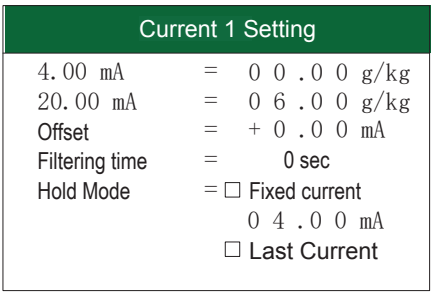


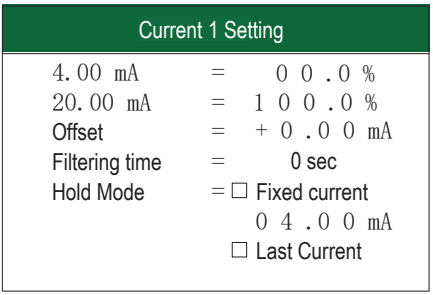
1. Temperature offset, range +/- 5.0 deg C
2. Whether the temperature is displayed on the measurement page

Output Settings



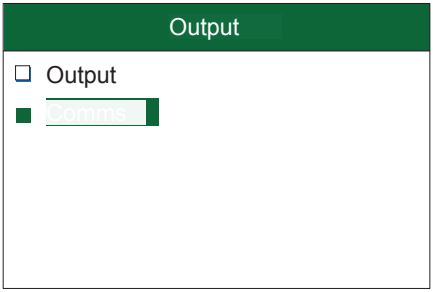


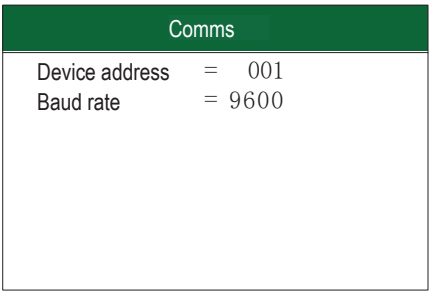




1. Set the corresponding value of the 4.00 mA output
2. Set the corresponding value of 20.00 mA output, the value between 4.00 mA and 20.00 mA must be at least 100mS or 1.00 g/Kg or 10% differential
3. Set the offset of the current, range +/- 1.00 mA
4. Set the current filtering time to 0-120 seconds, when the current changes from one point to another, passing a software low Through the intervention of the filter, the current presents a smoother output. The larger the filtering time, the slower the current change.
5. Set the current holding mode, UP/down button to select fixed current or final current, if fixed current is selected, After pressing enter, you can enter a fixed current

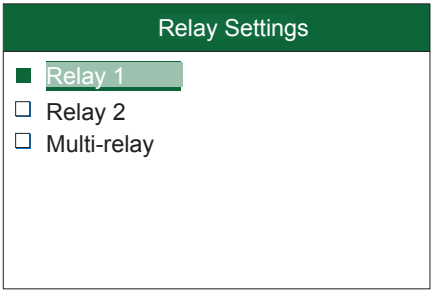
Description: The current setting plus and without offset finally shows the current value, the maximum current is 22.00 mA, the minimum current is 3.50 mA

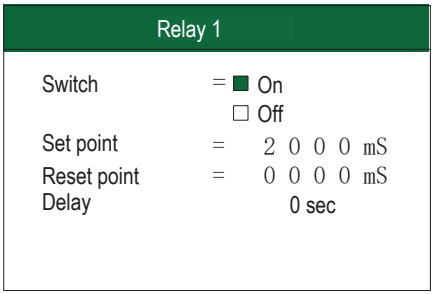


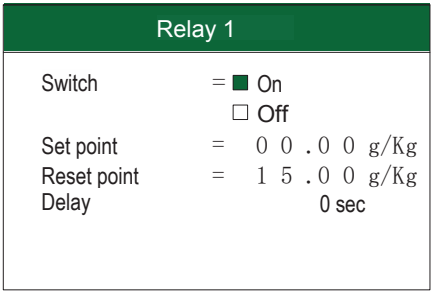


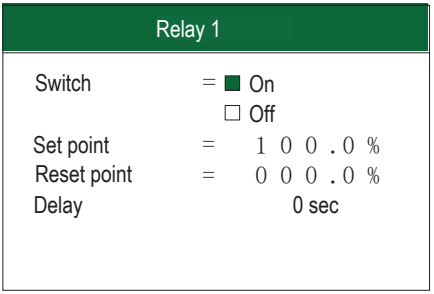
1. Selection of communication address: 1-255;
2. Press the UP/down key to select the communication rate.

Relay Settings





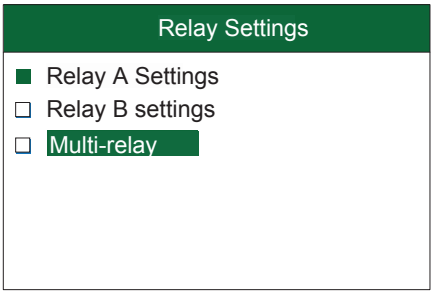


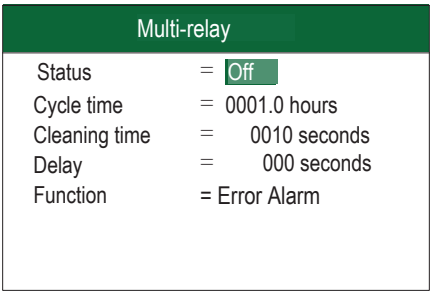


1. Switch: Press the UP/down key to select ON or off, if it is off, the relay will not work
2. Closing point: Closing point of the relay (action)
3. Release point: Relay release point (no action)
4. Delay time: 0-120 seconds, when the relay reaches the closing value, it must be delayed for a period of time before acting

Description: If you want the pump to operate at 50mS and release at 1000mS (the pump does not operate), the closing point is set to 50mS, Release point set to 1000mS

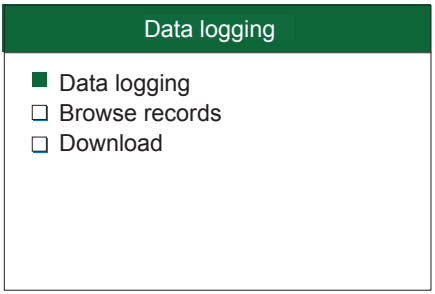
Note: The relay 2 setting is the same as the relay 1 setting, and the closing point of the relay and the value corresponding to the release point cannot be the same.

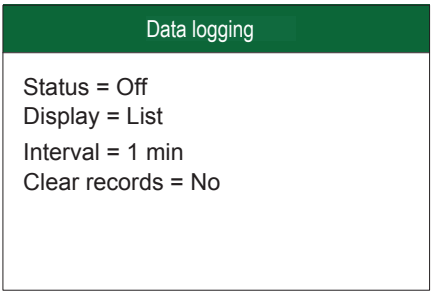


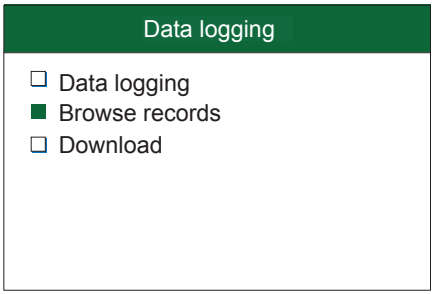


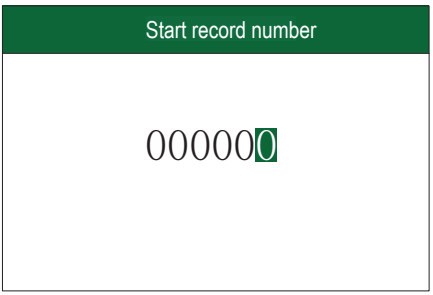
1. Switch: Press the UP/down key to select whether to turn it on or off, if it is off, the relay will not work;
2. Cycle time: cleaning cycle or cycle alarm time;
3. Cleaning time: When the cleaning cycle has reached, the time to start cleaning;
4. Delay time: When the relay reaches the closing value, it must be delayed for a period of time before acting;
5. Mode: Press the UP/down key to select cleaning, periodic alarm, error alarm.

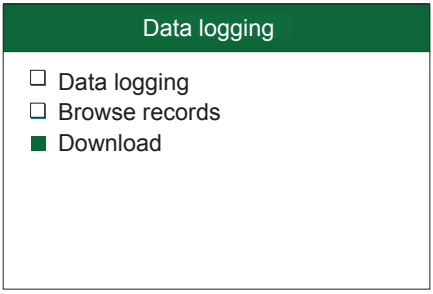
Data logging

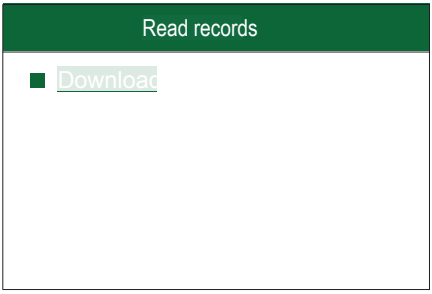












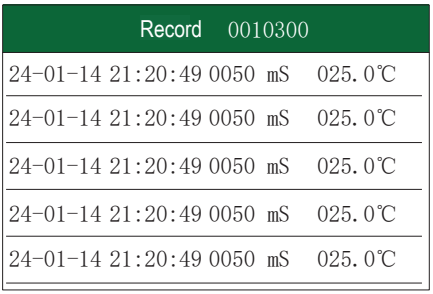
Press the UP/down key to select the function, and press the enter key to enter the data storage settings:

1. Record data on/off, UP/down key selection;
2. Display mode, UP/down key selection;
3. Storage interval 1-60 minutes.
4. Whether to clear all records, UP/down key selection;
5. Query the data and enter the start record;
6. Plug the USB drive into the USB port and perform the download function. It takes about 10 minutes for 500,000 files and about 50,000 files. It takes 1 minute.

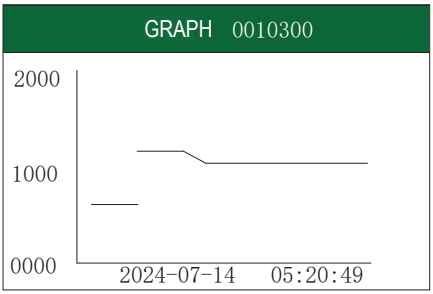
Remarks:

1. When the data is selected to be recorded as ON, in the measurement mode, the data will be stored according to the time of the storage interval.
2. Recording method: Select record display (5 records per page) or graphical display (150 records per page).
3. When clearing records is selected, wait about 10 seconds before all records are cleared.

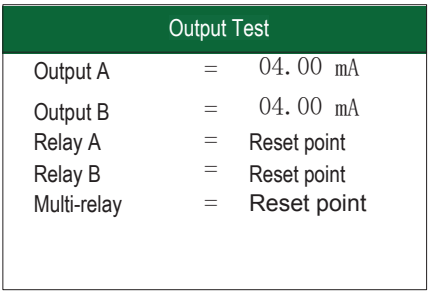
List view: 5 records per page



Graph view: 150 records per page



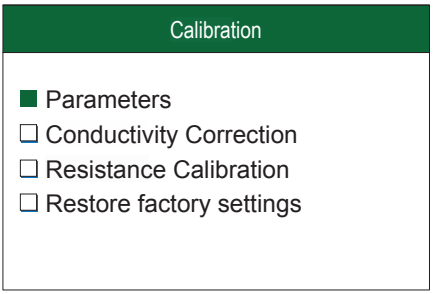
Output Test



1. Current output A test: 4.00-20.00 mA.
2. Relay A test: select with UP/DOWN.
3. Relay B test: select with UP/DOWN.

This function tests current outputs and relay operation.

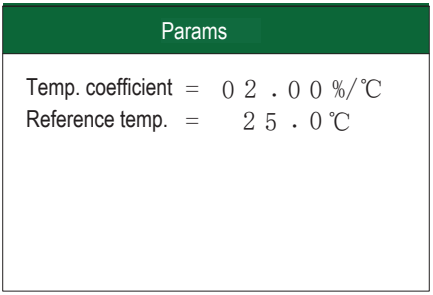
Calibration



Use the UP/DOWN keys to select a function, press ENTER to enter calibration

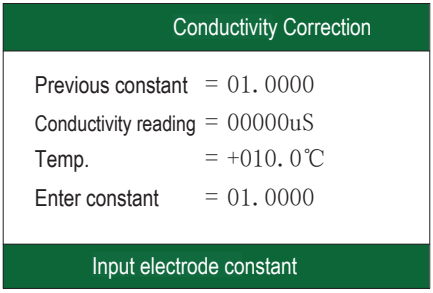
1. Parameter Setting: Enter the solution temperature coefficient and reference temperature
2. Zero Calibration: Calibrate the conductivity zero point
3. Slope correction: correct the conductivity slope
4. Restore factory settings: Restore the calibration values at the time of factory settings

Parameters



1. Solution temperature coefficient: Enter the temperature coefficient of the solution,
Range: 0.01% to 40.00%
2. Enter the reference temperature: range 15 deg C to 35 deg C

Note: Generally, conductivity is compensated back to 25.0°C,
If the user wants to compensate back to other temperatures, it can be changed
Reference temp.

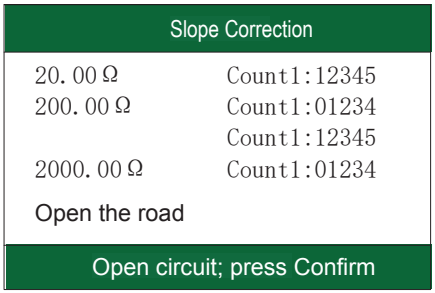


1. Place the electrode in a known standard solution.

2. The conductivity measurement value will display the conductivity currently measured by the electrode.

3. After waiting for stabilization, use the up and down keys to enter the electrode constant, so that The conductivity measurement value is the same as the standard solution value, press the confirm button Save

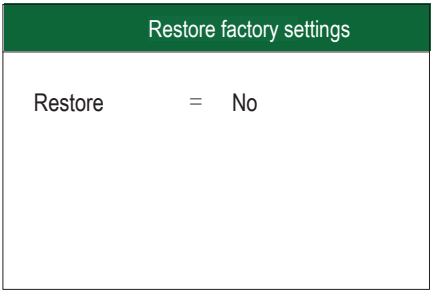
4. If the electrode's measurement value is greater than the selected measurement section's maximum or the temperature is outside 0.0-60.0 deg C, an error appears below the display.



1. During calibration, pass a 20/ through the sensor ring hole in sequence. High-precision calibration resistors of 200/2000 ohm, then connected end to end, After the reading stabilizes, press ENTER, and finally remove the resistor from the slot. Perform an open-circuit calibration in the air to complete the calibration.

2. For different ranges, the calibration resistor values are also different, here Taking 0-50 mS as an example

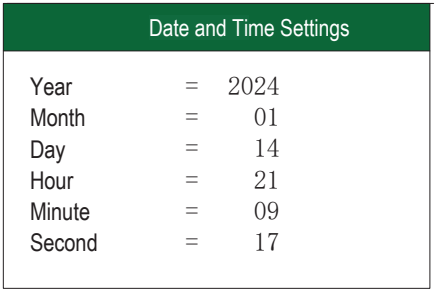
Restore factory settings



This function will reset the calibration values to the factory settings.

Note: The recovery here refers to restoring the calibration to factory settings, not Parameters changed in the effect settings.

General Settings - Date Settings



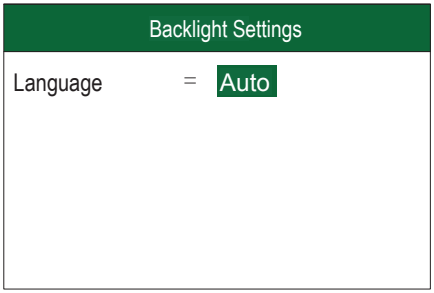
Use the UP/DOWN keys to set the date and time. After a power outage,
The effect will last for about two days.

General Settings - Language Settings



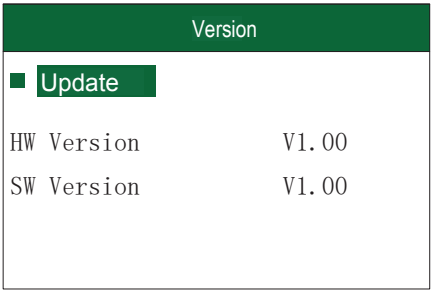
Display language: English

General Settings - Backlight Settings



Use the UP/DOWN keys to select 60-second auto backlight shutdown or use
Manual backlight.

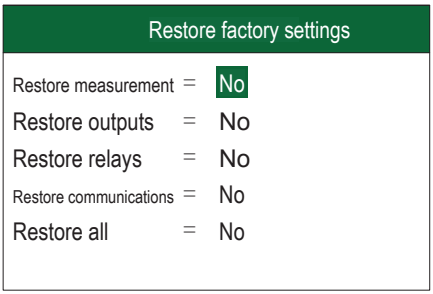
General Settings - Version



Displays the current version and model, and can be inserted when updating the software USB drive, select software update, put the new software into the USB drive, execute

Updating the software takes about 30 seconds.

General Settings - Restore Factory Settings



Press the UP/DOWN keys to select individual restore current or relay or It is all, but it does not affect the following values: language, backlight settings Centering settings comparison, communication settings, measurement mode.

Note: The recovery here will not affect conductivity or resistivity. Calibration values for salinity and TDS

Factory Default Values

EC 20.00mA corresponds to a value of 2000 uS/cm	Range: 100 - 2000
EC 4.00mA corresponds to 0 uS/cm	Range: 0 - 1900
	The difference between high and low is at least 100
Salinity 20.00 mA corresponds to a value of 20.00 M ohm	Range: 0.00 - 78.00
Salinity 4.00 mA corresponds to a value of 0.00 M ohm	Range: 0.00 - 77.00
	The difference between high and low is at least 1.00
Concentration 20.00 mA corresponds to a value of 100.0%	Range: 0.0 - 100.0
Concentration 4.00 mA Corresponding value 0%	Range: 0.0 - 99.0
	The difference between high and low is at least 1
Temperature 20.00 mA corresponding value 100.0 deg C	Range: 0.0 - 130
Temperature 4.00mA Corresponding value 0.0 deg C	Range: -10.0 - 120.0
	The difference between high and low is at least 10.0
Current 1 output offset 0.00 mA	Range: +/- 1.00
Current 1 filter time 1 second	Range: 0 - 120
Current 1 Fixed Output Current 4.00 mA	Range: 4.00-20.00
Current 1 hold mode last	Scope: Fixed/Final
Relay 1 EC closing point 1000 uS/cm	Range: 0 - 2000
Relay 1 EC release point 10 uS/cm	Range: 0 - 2000
	The smallest difference between the two is 1
Relay 1 Salinity Closing Point 10.00 g/kg	Range: 0.00 - 30.00
Relay 1 Salinity Release Point 0.1 g/kg	Range: 0.00 - 30.00
	The minimum difference between the two is 0.01
Relay 1 Concentration Closing Point 100 %	Range: 0 - 100.0
Relay 1 Concentration Release Point 1%	Range: 0 - 100.0
	The smallest difference between the two is 1
Relay 1 delay time 0 seconds	Range: 0 - 120
Relay 2 EC closure point 10 µS/cm	Range: 0 - 2000
Relay 2 EC release point 1000 uS/cm	Range: 0 - 2000
	The smallest difference between the two is 1
Relay 2 Salinity Closing Point 0.1 M ohm	Range: 0.00 - 30.00
Relay 2 Salinity Release Point 20.00 M ohm	Range: 0.00 - 30.00
	The smallest difference between the two is 1
Relay 2 Concentration Closing Point 10%	Range: 0 - 100
Relay 1 Concentration Release Point 100%	Range: 0 - 100
	The smallest difference between the two is 1

Relay 3 cycle time: 1 h (range 0.1-1000.0 h)
Relay 3 cleaning time: 10 s (range 1-1000 s)
Relay 3 delay: 0 s (range 0-120 s)
Relay 3 function: Error alarm (options: Cleaning, Periodic alarm, Error alarm)
Logging interval: 1 min (range 1-60 min)
Communication ID: 1 (range 1-255)
Baud rate: 9600 (options: 9600, 19200, 38400)
EC offset 0.00 uS/cm Range: +/-100
Salinity offset 0.00 g/kg Range: +/-1.00
Concentration offset 0.00 ppm Range: +/-100
Measurement mode 0-2000 uS/cm Range: 0-20.000,

0-20.00/0-200.0
0-2000/0-20.00
0-200.0/0-2000

Temperature offset 0.0 deg C Range: +/- 5.0
Manual temperature measurement 25.0 deg C Range: -10.0 - 130.0
Manual temperature calibration 25.0 deg C Range: 0.0 - 60.0
Filter 1 Range: 0-10
Temperature compensation: Auto (options: Auto, Manual)
Temperature probe: NTC30K (options: Pt1000, NTC30K)
Record display: List (options: List, Graph)

Password

Press the SET button
SHIFT: User Electrode Calibration
0001: Function Settings
If no key is pressed within 10 minutes, it will automatically exit, and all changed parameters will be saved before exiting.

Error code

Error 01	Memory Error
Error 02	The measured value is greater than the maximum value
Error 03	The measured value is less than the minimum value
Error 04	Temperature exceeds maximum value
Error 05	Temperature is below the minimum value
Error 06	The first channel current output exceeds 20.5 mA, with a maximum current limit of 22.00 mA
Error 07	The first channel current output is below 3.8 mA, with a minimum current limit of 3.5 mA
Error 08	The output current of the second channel exceeds 20.5 mA, with a maximum current limit of 22.00 mA
Error 09	The output current of the second circuit is below 3.8 mA, with a minimum current limit of 3.5 mA
Error 10	Recorder malfunction
Error 11	ADC malfunction
Error 12	Factory information lost

The instrument uses Modbus RTU. Measurement values are floating point; other parameters use two bytes.

Values from -32767 to 32767 are hexadecimal; the most significant bit is the sign bit.

Master request frame:

	ID Address	Function	Start address	Quantity	CRC16
Bytes	1 byte	1 byte	2 byte	2 byte	2 byte
Example	0x01	0x03	0x0001	0x0001	0xD5CA

Example: read the first data item; see the table below.

Slave response frame:

	ID Address	Function	Data quantity	Data value	CRC16
Bytes	1 byte	1 byte	1 byte	N byte	2 byte
Example	0x01	0x03	0x02	0x02 0xBC	0xB895

Exception 01: unsupported function code.

Exception 02: invalid address.

Exception 03: invalid data quantity.

Function 03: read settings.

Function 04: read measurements.

Function 04 register map

Address				
(00)	0x00	Model	Value: fixed M	
(01) 0x01	Model identifier		Value: fixed 2	
(02)	0x02/0x03	Measured value		Value: floating point
(04)	0x04/0x05			
(06)	0x06	Temp.		Scale: x0.1
(07)	0x07	Current output 1		Scale: x0.01
(08)	0x08	Current output 2		Scale: x0.01
(09)	0x09	Unit	Scale: x1	
(10)	0x0A			
(11) 0x0B	Error Code			Scale: x1
(12) 0x0C	Status			Scale: x1

Function 03 register map

Address			
(00)	0x00	EC output 1 at 20.00 mA	Scale: x1
(01)	0x01	EC output 1 at 4.00 mA	Scale: x1
(02)	0x02	Salinity output 1 at 20.00 mA	Reading: X0.01
(03)	0x03	Salinity output 1 at 4.00 mA	Reading: X0.01
(04)	0x04	Concentration output 1 at 20.00 mA	Reading: X0.1
(05)	0x05	Concentration output 1 at 4.00 mA	Reading: X0.1
(06)	0x06	Temperature output 1 at 20.00 mA	Value: floating point
(07)	0x07	Temperature output 1 at 4.00 mA	Value: floating point
(08)	0x08	Output 1 offset	Scale: x0.01
(09)	0x09	Output 1 filter time	Reading: X1
(10)	0x0A	Output 1 fixed current	Reading: X0.0 1
(11)	0x0B	Output 1 hold mode	Reading: X1 0 = constant current, 1 = Final current

(12) 0x0C Relay 1 EC set point | x1
(13) 0x0D Relay 1 EC reset point | x1
(14) 0x0E Relay 1 salinity set point | x0.01
(15) 0x0F Relay 1 salinity reset point | x0.01
(16) 0x10 Relay 1 concentration set point | x0.1
(17) 0x11 Relay 1 concentration reset point | x0.1
(17) 0x11 Relay 1 delay | x1
(18) 0x12 Relay 2 EC set point Scale: x1
(19) 0x13 Relay 2 EC reset point | x1
(20) 0x14 Relay 2 salinity set point | x0.01
(21) 0x15 Relay 2 salinity reset point | x0.01
(22) 0x16 Relay 2 concentration set point | x0.1
(23) 0x17 Relay 2 concentration reset point | x0.1
(24) 0x18 Relay 2 delay | x1
(25) 0x19 Relay 3 cycle time | x0.1
(26) 0x1A Relay 3 cleaning time | x0.1
(27) 0x1B Relay 3 delay | x1
(28) 0x1C Relay 3 function | x1 0=cleaning,
1=periodic alarm, 2=error alarm
(29) 0x1D Logging interval | x1
(30) 0x1E EC offset | x1
(31) 0x1F Salinity offset | x0.01
(32) 0x20 Temperature offset | x0.1
(33) 0x21 Language | x1 0=English, 1=Chinese

(28) 0x1C Filter | x1
(29) 0x1D Solution temperature coefficient | x0.01, range 0.01%-40.00%
(30) 0x1E Measurement mode | x1 0=EC,
2=salinity, 4=concentration
(31) 0x1F
(32) 0x20 Manual measurement temperature | x0.1
(33) 0x21 Manual calibration temperature | x0.1
(34) 0x22 Temperature compensation mode | x1 0=automatic,
1=manual