Conductivity Controller
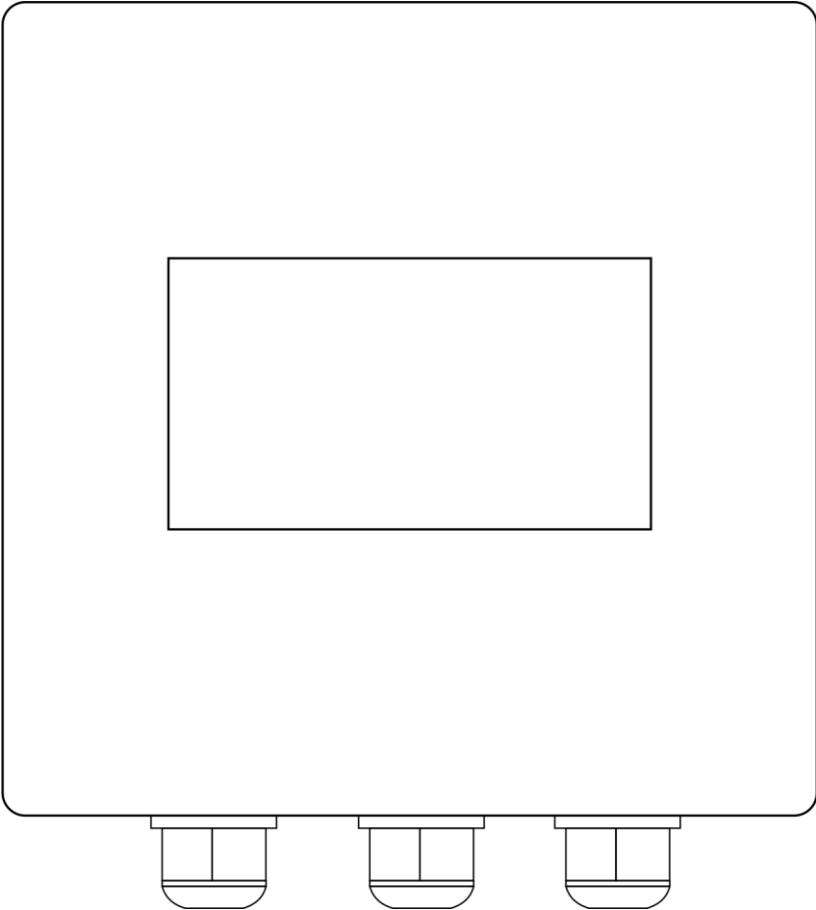
Content

Safe operation procedures

Read the following instructions before using the instrument.

1. After unpacking the instrument please check for damage due to shipping.
2. The instrument must be operated by trained professional and technical personnel.
3. Read the manual carefully to avoid incorrect wiring connection that can cause equipment damage and safe problem.
4. After wiring carefully check all are correct then can power on and make sure the others equipments are correct.
5. Please avoid installing in a high humidity, high temperature, corrosive and in a direct sunlight environment.
6. Please separate the power lines of instrument from other machines that produces high noise in the power lines.

Instrument use

Instruments are used in industrial measuring of the temperature, conductivity, Resistivity, salinity and total dissolved solids, such as wastewater treatment, environmental monitoring, pure water, sea farming, food production process, etc.
The instrument can be panel, wall or pipe mounted.
The instrument provides one current outputs. The maximum load is 500 Ohm.
The instrument provides 2 relays. It can pass though a maximum of 5 Amps at 250 VAC or 5 Amps at 30VDC.

Product content

The product package contains 1 instrument, the printed manual, 2 holders

Specifications

| Functions	EC	Resistivity	TDS
Measuring range	0.00uS-2000mS	0.00-20.00 MΩ-CM	0-99999ppm
Resolution	0.01/ 0.1/ 1	0.01	1
Accuracy	±1%F.S.	±1%F.S.	±1%F.S.
Temp. compensation	Pt 1000/NTC30K		
Temp. range	-10.0 to +130.0℃		
Temp. compensation range	-10.0 to +130.0℃		
Temp. resolution	0.1℃		
Temp. accuracy	±0.2℃		
Cell constant	0.001 to 20.000		
Ambient temperature range	0 to +70℃		
Storage temp.	-20 to +70℃		
Display	Back light, dot matrix		
Current output	Isolated, 4 to 20mA output , max. load 500Ω		
Current output accuracy	±0.05 mA		
RS485	Modbus RTU protocol		
Baud rate	9600（regular）		
Maximum relay contacts capacity	5A/250VAC,5A/30VDC		
Language selection	English/traditional Chinese/simplified Chinese		
Waterproof grade	IP65		
Power supply	From 90 to 260 VAC, power consumption < 7 watts		
Installation	panel/wall/pipe installation		
Weight	0.55Kg		

Instrument installation

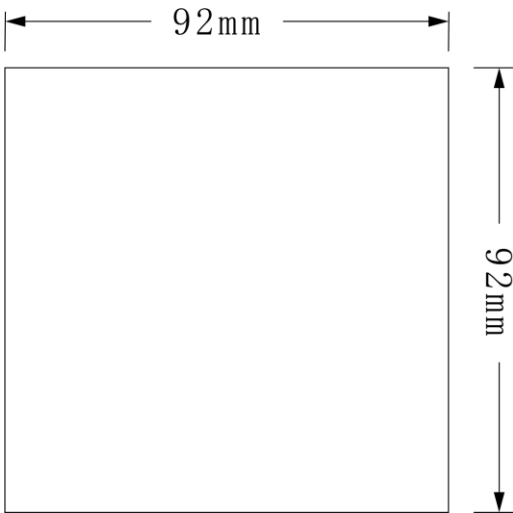The instrument can be panel, wall or pipe mounted installation.
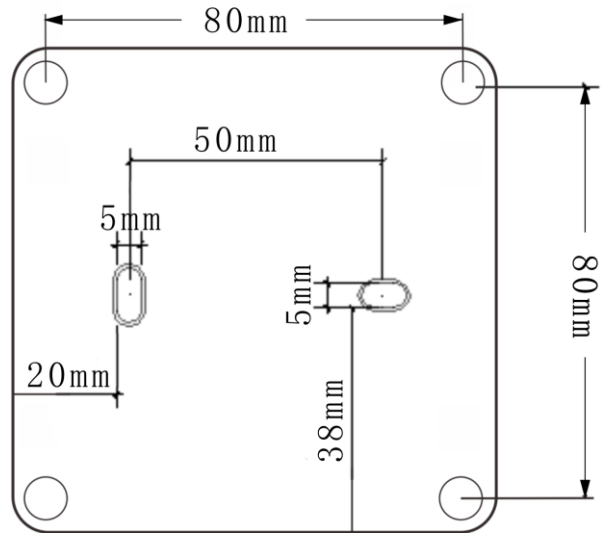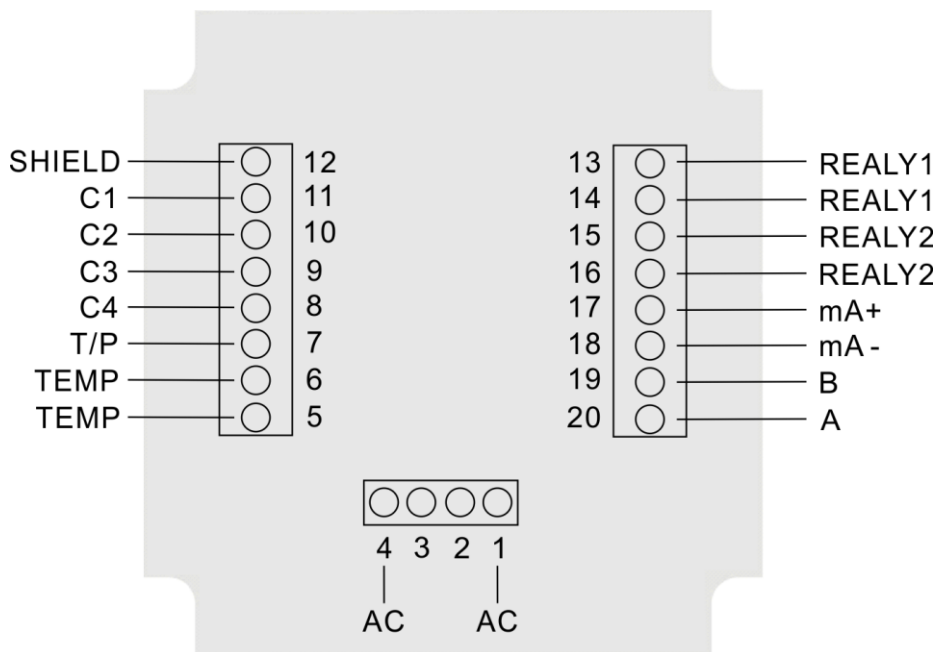Panel Installation: Make a 92x92 mm square cutout and insert the instrument then screw in the fixed HOLDER.
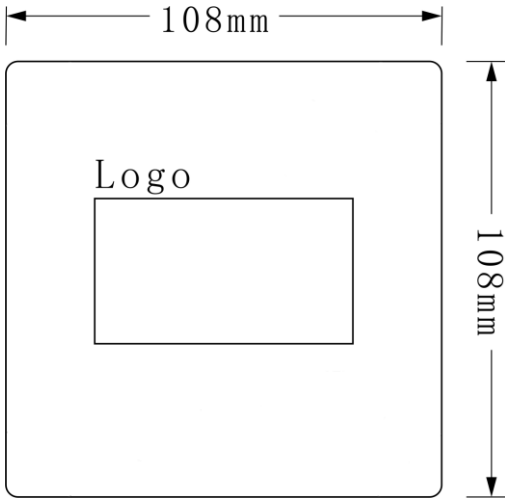
front size
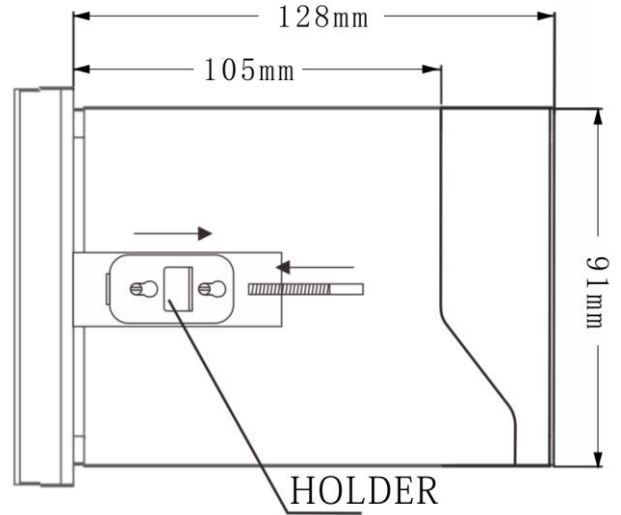
3000 series dimension

Panel Installation： Make a 92x92 mm square cutout and insert the instrument then screw in the fixed HOLDER.
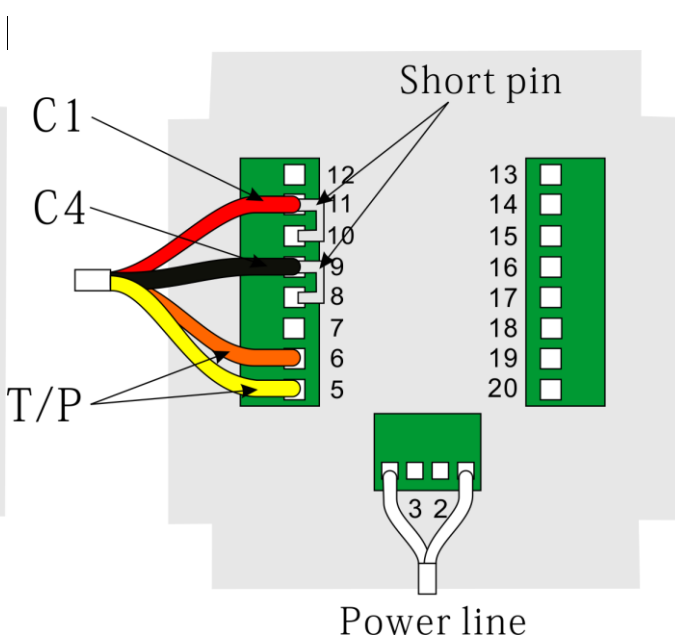
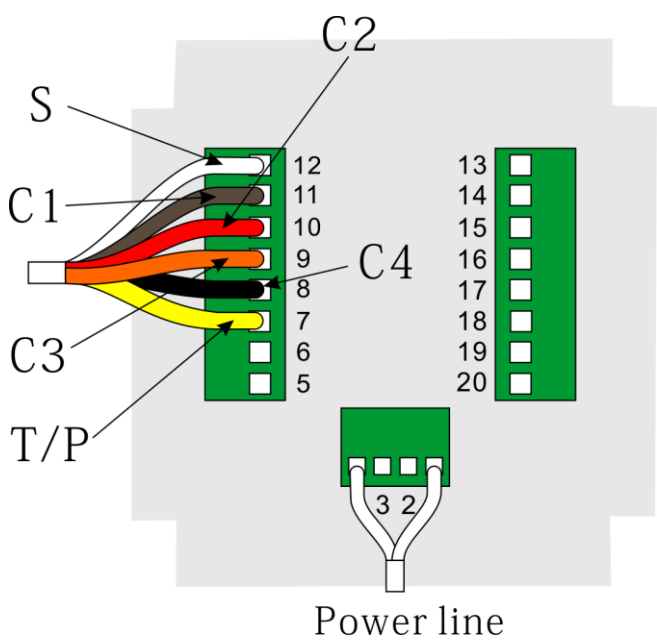for wall/pipe mounting

Connection label

Electrode connection figure

4 ELECTRODES

2 ELECTRODES

Power line

Power line
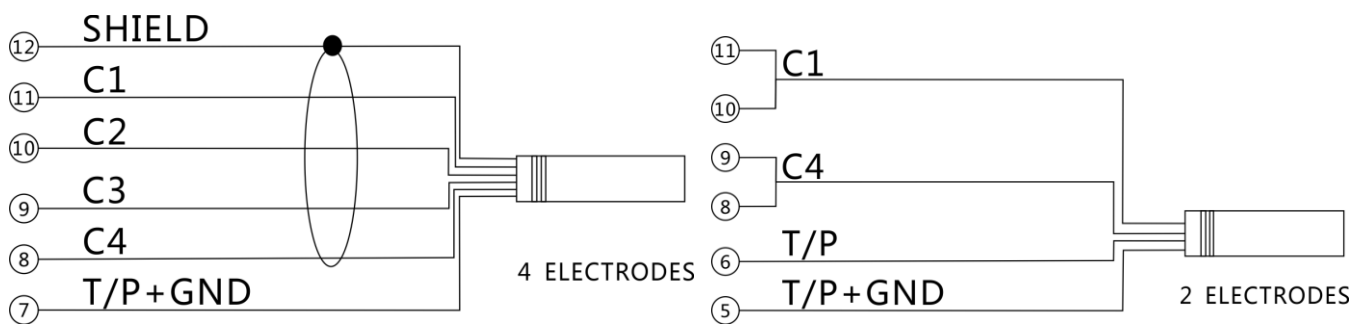
Relay contact protection

Electrical spark at the relay contact may affect the life of the relay, especially in an inductive and capacitive load. In order to inhibit the spark and arc, user should use an RC circuit to extend the life of the relay.
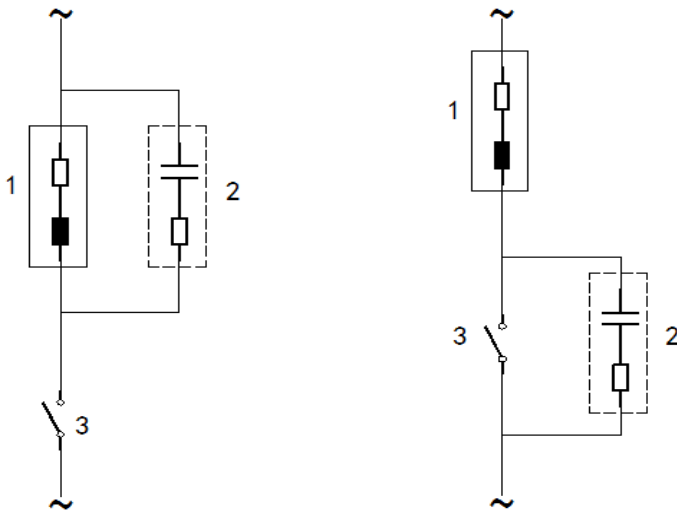
AC protection, use for inductive load
1. load
2. RC eliminate spark, using in 220VAC, R=100 ohm1W,
3. Relay contact
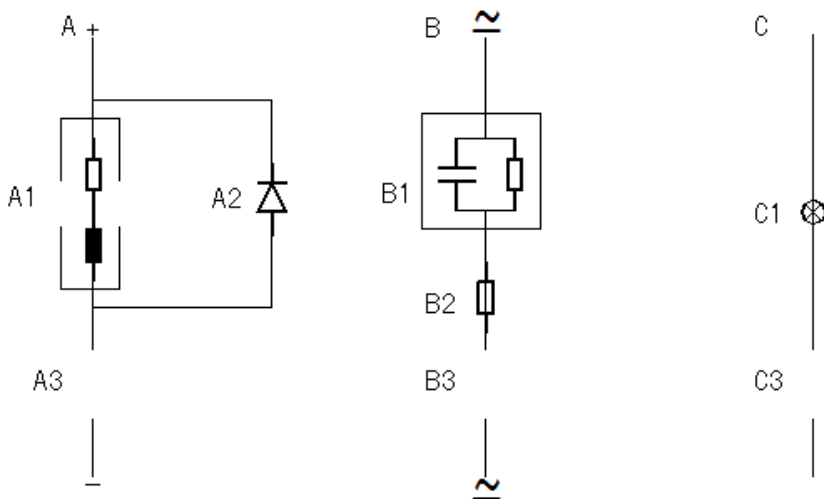
A. DC protection ,A1: inductive load   A2: 1N4007, A3: relay contact
B. AC/DC protection ,B1: capacitive load ,B2: 0.8 Ohm/1W（DC24V）,B3: relay contact
C. Resistive load ,C1:lamp bulb ,C3:relay contact

Display

1. Main display
2. Temperature and unit
3. current output
4. Temp. compensation: auto(ATC) or manual(MTC)
5. Relay indicator

Note：

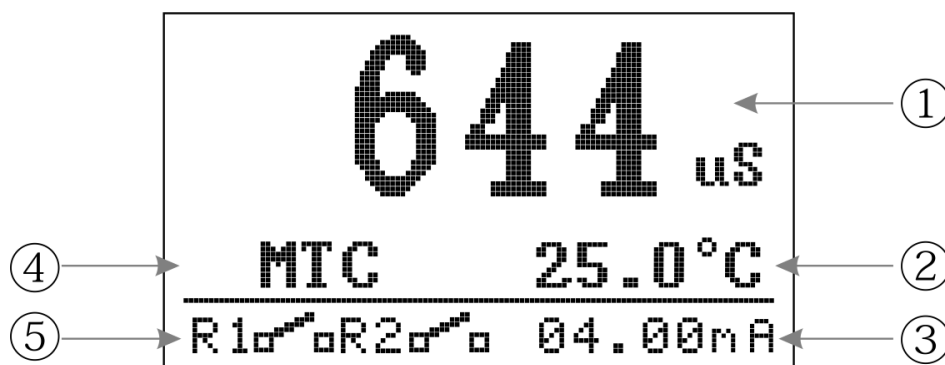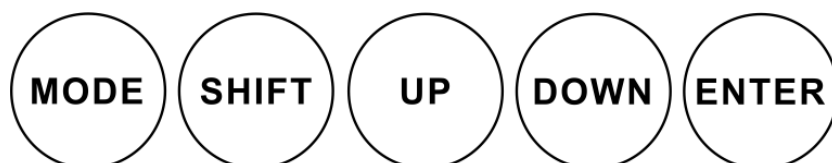If the EC readings are over the range, it will display 99.99/999.9/9999

If the temperature readings are under or over the range, it will display -99.9/999.9.

Key

Key name	Meas. status	Setting status	Cal. status
MODE	Enter password	Exit	Exit
SHIFT	none	Move digit	Move digit
UP	none	Inc	Inc
DOWN	none	Dec	Dec
ENTER	ON/OFF back light	Enter	Enter

Keeping mode

Keeping mode is a safe mode. It is for Calibration, Setting, Record and Clean. In this mode all the relays are open(inactive), current output follows the setting by user(last current or fixed current).

The instrument will enter keeping mode when user presses into Calibration, Setting, Record or the instrument works in clean mode.

It will in keeping mode around 10 seconds when it goes back to measurement mode form the above mentioned 4 modes then left keeping mode.

The instrument will go into the keeping mode when turn on the power, and will going to testing mode after 10 seconds.
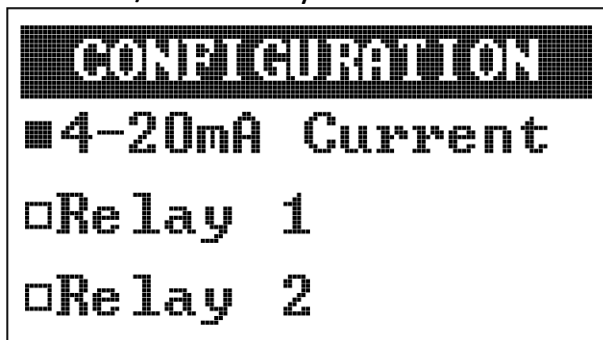
Setting

Press MODE key to enter the password menu and then press UP/DOWN/SHIFT key to input password 1200 then press ENTER will enter to setting mode or press MODE key to exit. If no key is be pressed and over 10 minutes then it will go back to measurement mode.
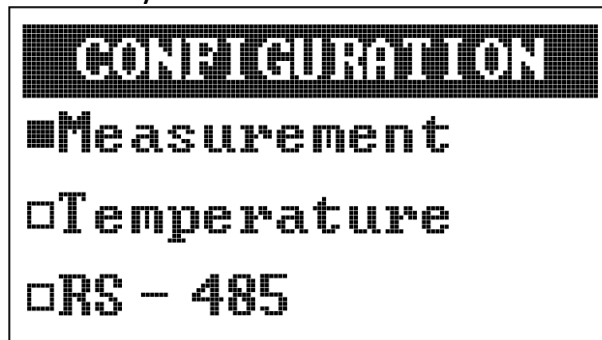

Main screen
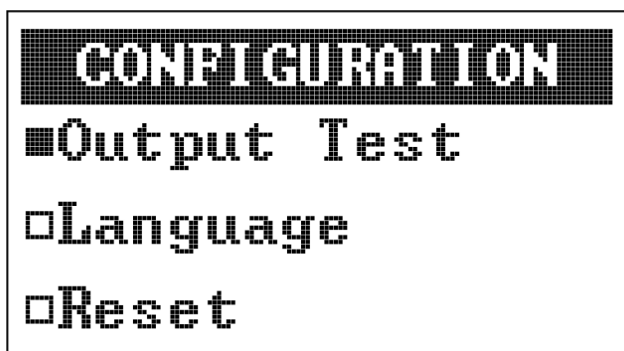
Press UP/DOWN key to choose functions, press ENTER key enter the function.

Page1

Page2

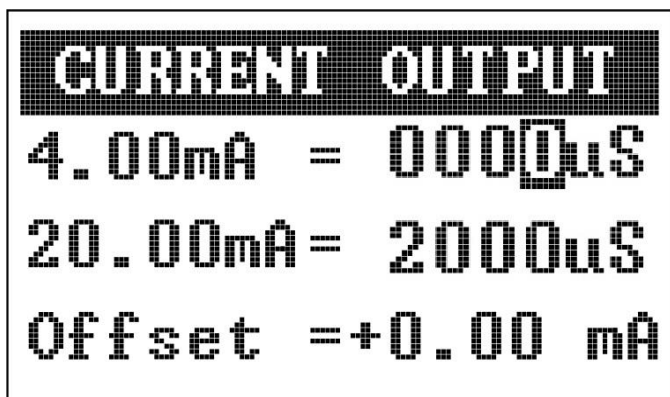

Page3

Notices：
1. When the input data is not in correct range then it will display ERROR on the top of LCD.
2. After input data user needs to press ENTER to save the data.
3. Press MODE to exit.
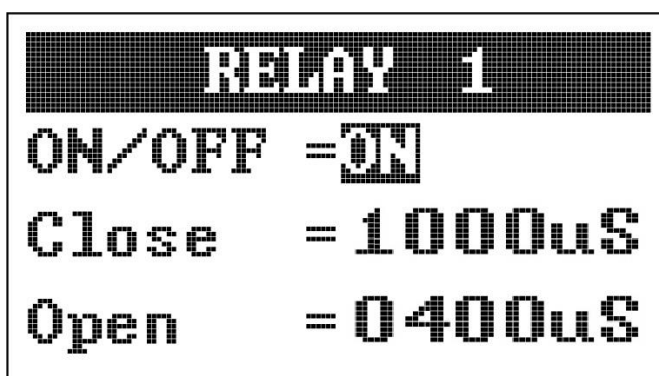4. No key is be pressed in 10 minutes then it will go back to measurement mode.

Current settings

```
CURRENT OUTPUT
4.00mA  =  0000uS
20.00mA =  2000uS
Offset  =+0.00  mA
```

1. Set the corresponding 4.00mA to EC/ Resistivity/Salinity/TDS.
2. Set the corresponding 20.00mA to EC/ Resistivity/Salinity/TDS, the difference between 4.00mA and 20.00 mA at least for EC is 1.00/10.0/100(according to the range), for Resistivity is 1.00,for Salinity is 1.00,for TDS is 100.
3. Set the offset current ,the range is ± 1.00mA.

Relay 1 settings

```
RELAY 1
ON/OFF  =ON
Close   = 1000uS
Open    = 0400uS
```

1. Press UP/DOWN key to ON/OFF (enable/ disable) relay1.
2. Close set point: active point for EC/ Resistivity/Salinity/TDS.
3. Open set point: inactive point for EC/ Resistivity/Salinity/TDS.

Note: If user wants turn on the pump at EC 1000uS and turn off it at EC 400uS, then the close S.P. needs to set to 1000uS, Open S.P. sets to 400uS.

Relay 2 settings

```
RELAY 2
ON/OFF  =ON
Close   =0400uS
Open    =1000uS
```
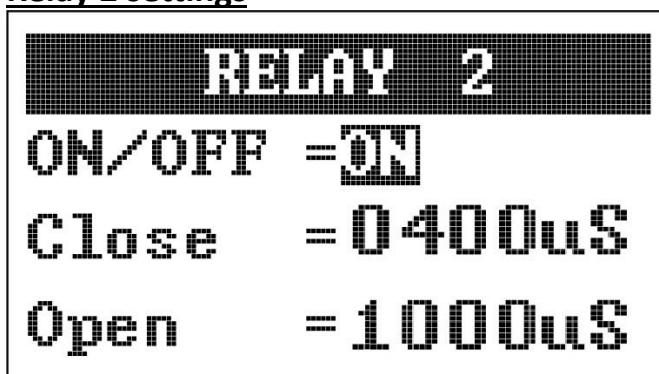
1. Press UP/DOWN key to ON/OFF (enable/ disable) relay2.
2. Close set point: active point for EC/ Resistivity/Salinity/TDS.
3. Open set point: inactive point for EC/ Resistivity/Salinity/TDS.

Note: If user wants turn on the pump at EC400uS and turn off it at EC 1000uS, then the close S.P. needs to set to 400uS, Open S.P. sets to 1000uS.
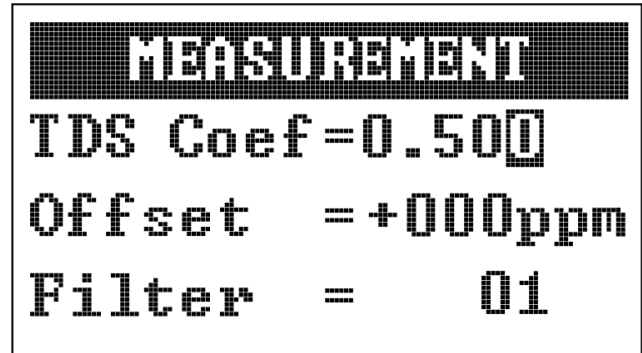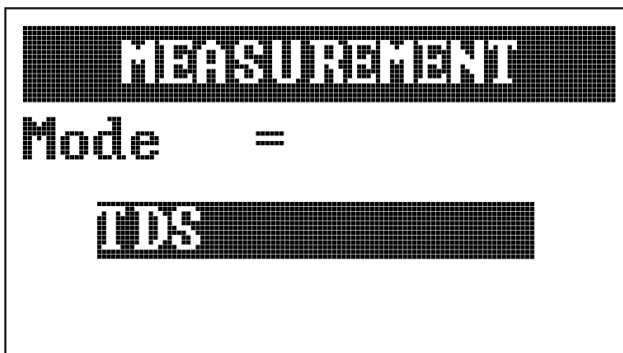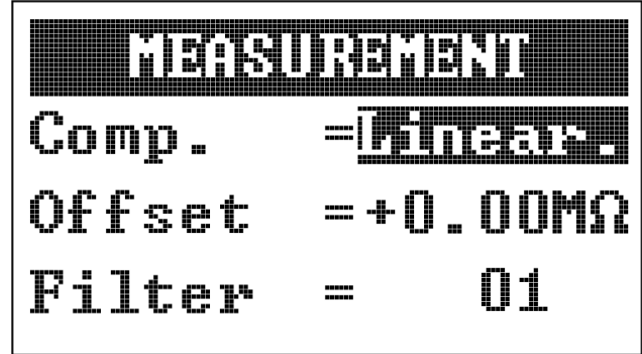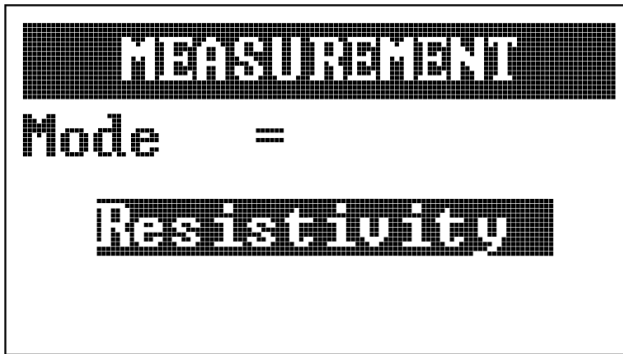
Measurement settings

MEASUREMENT	MEASUREMENT
Mode = **Conductivity**	Range = **2000uS** Offset = +000uS Filter = 01
Mode = **Resistivity**	Comp. =**Linear.** Offset =+0.00MΩ Filter = 01
Mode = **TDS**	TDS Coef=0.50**0** Offset =+000ppm Filter = 01
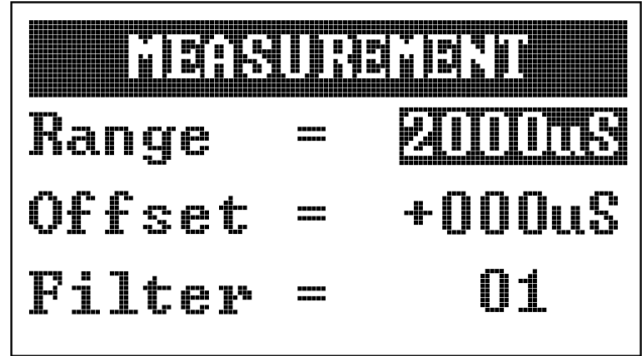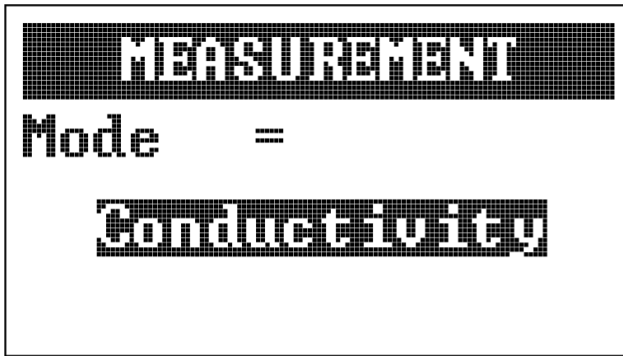
1. Choose the mode for measuring, press UP/DOWN key to choose, press ENTER to next.
2. The Range selection for EC only.
3. Offset , range for EC is ±1.00uS/ ±10.0uS/ ±100uS/ ±1.00mS/ ±10.0mS/ ±100mS,for Resistivity is ±1.00MΩ,for Salinity is ±1.00g/Kg, for TDS is ±100ppm

Notice : If the reading is not stable then user can set the filter to average the readings.

Temperature settings

TEMPERATURE
Probe =**NTC 30K** Offset = +0.0°C Manual =+025.0°C
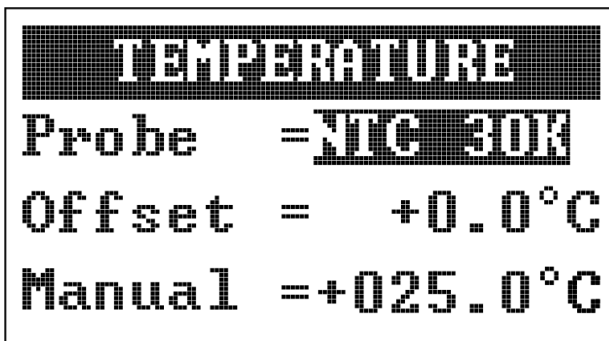
1. Temperature probe, press UP/DOWN key to choose.
2. Temperature offset ,the range is±5.00℃.
3. Temperature for measuring when user set the temperature to manual.

RS485 settings

1. ID address:1-255.

Output test
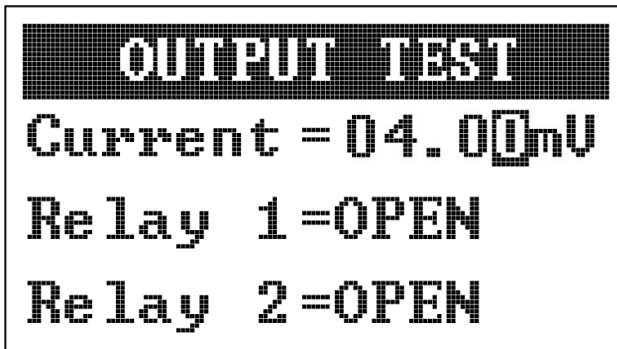
1. Current output: 4.00-20.00mA, press UP/DOWN to set.
2. Relay 1 output, press UP/DOWN to choose.
3. Relay 2 output, press UP/DOWN to choose.

Notice: This function for testing the output only.

Language settings

Press UP/DOWN key to choose the language.

Reset parameters
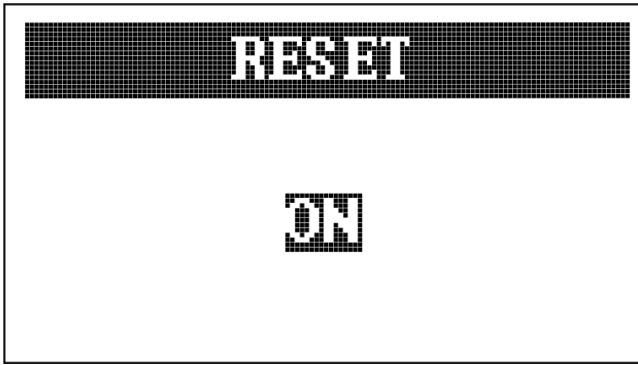
Press UP/DOWN key to choose the reset.

Notice：The reset will not affect the calibrated parameters.

EC Calibration

Press MODE key to enter the password menu and then press UP/DOWN/SHIFT key to input password 1100 then press ENTER will enter to calibration mode or press MODE key to exit. If no key is be pressed and over 10 minutes then it will go back to measurement mode.

主畫面
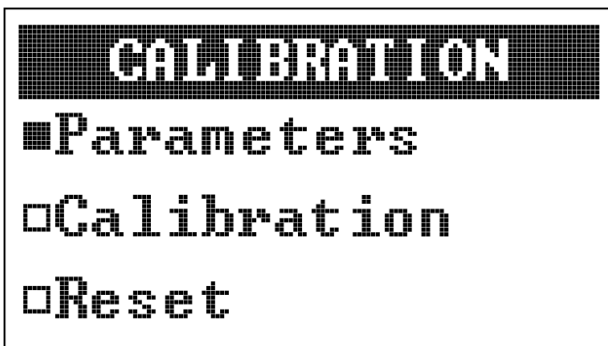
Please reset parameters before calibrate. Press UP/DOWN key to select the functions and then press ENTER key to enter.

1. parameters setting: Input the parameters.
2. Calibration: Calibrate the EC.
3. Reset parameters: reset all of the calibrated parameters to default.

Notice: If the cell constant is over than ±30%, user should Replace the new electrode.

Reset parameters

```
RESET


   ON
```
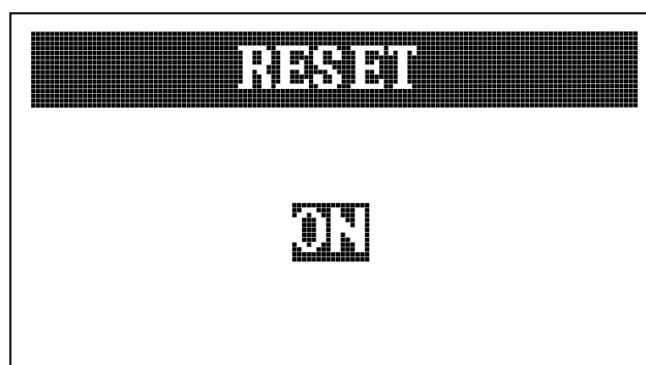
Press UP/DOWN key to select the functions and then press ENTER key to enter.

Notice：The rest parameters in here just back to original setting, it would not affect the calibrated parameters.

Parameters Setting

```
PARAMETERS
Temp.Co. =02.00%
Ref.Temp= 25.0°C
```
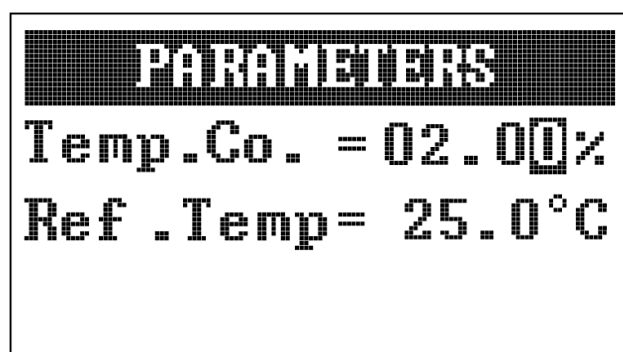
1. Temperature Coefficient of solution: the range is form 0.01 to 40.00%
2. Reference Temperature: the range is from 15.0 to 35.0 ℃

Calibration

```
CALIBRATION
EC    =      0000mS
Temp.=   +025.2°C
Input =   10.0000
```
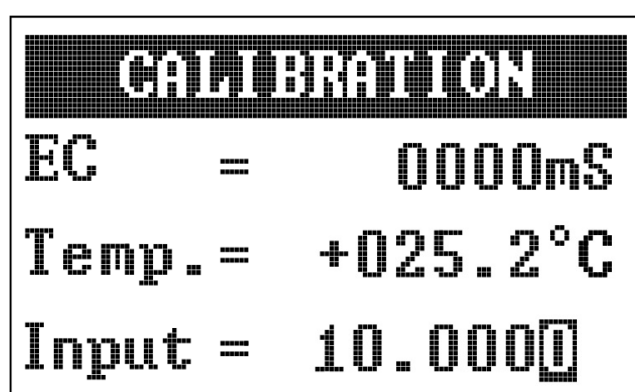
1. Put the electrode to the standard solution.
2. It will display the EC reading.
3. When the EC reading is stable then press UP/DOWN key to modify the cell constant to make the EC reading correspond to the standard solution.
4. If the EC Reading is over the EC range or the temperature is over 0.0-60.0℃ then it will display error message on the button of LCD.

Default

EC 20.00mA	corresponding	2000	uS	range: 100 - 2000
EC 4.00mA	corresponding	0	uS	range: 0 - 1900
				difference : 100uS
RES 20.00mA	corresponding	20.00	MΩ	range: 1.00 - 20.00
RES 4.00mA	corresponding	0.00	MΩ	range: 0.00 - 19.00
				difference : 1.00 MΩ
TDS 20.00mA corresponding		2000	ppm	range：100 to 99999
TDS 4.00mA corresponding		0	ppm	range：0 to 99800
				difference: 100ppm
Current output offset		0.00	mA	range: +/- 1.00
Relay 1 EC close S.P.		1000	uS	range: 0 - 2000
Relay 1 EC open S.P.		10	uS	range: 0 - 1900
				difference : 1uS
Relay 1 RES close S.P.		10.00	MΩ	range: 0.00 - 20.00
Relay 1 RES open S.P.		0.1	MΩ	range: 0.00 - 19.00
				difference : 0.01MΩ
Relay 1 TDS close S.P.		1000	ppm	range：0 to 99999
Relay 1 TDS open S.P.		10	ppm	range：0 to 99998
				difference :1ppm
Relay 2 EC close S.P.		1000	uS	range：0 to 2000
Relay 2 EC open S.P.		10	uS	range：0 to 1900
				difference :1uS
Relay 2 RES close S.P.		10.00	MΩ	range：0.00 to 20.00
Relay 2 RES open S.P.		0.1	MΩ	range：0.00 to 19.00
				difference: 0.01MΩ
Relay 2 TDS close S.P.		1000	ppm	range：0 to 99999
Relay 2 TDS open S.P.		10	ppm	range：0 to 99998
				difference: 1ppm
ID address		1		range: 1 - 255
Baud rate		9600（regular）		
EC Offset		0	uS	range: +/-100
Resistivity Offset		0.00	MΩ	range: +/-1.00
TDS Offset		0	ppm	range: +/-100
Mode		EC		range：EC/RES/TDS
Measuring range		0-2000uS		range: 0-20.00uS/0-200.0uS
				0-2000uS/0-20.00mS
				0-200.0mS/0-2000mS
Temp. Offset		0.0	℃	range: +/- 5.0
Language		English		range: English/traditional
				Chinese/simple Chinese

Filter	1	range: 0 - 10		
Temp. compensation	manual	range: manual		
Temp. probe	NTC30K	range: Pt1000, NTC30K		

Password

Press MODE key
1100:Calibration mode
1200:Setting mode
If no key is be pressed and over 10 minutes then it will go back to measurement mode.

RS485 command

The instrument use the standard Mod bus-RTU protocol, all of the data are word type(2 bytes), the range is -32767～32767 ,16 system.

PC command:

	ID address	command	Start address	Data number	CRC16
length	1 byte	1byte	2 byte	2 byte	2 byte
Ex.	0x01	0x03	0x0001	0x0001	0xD5CA

Instrument response:

	ID address	command	Data number	data	CRC16
length	1 byte	1 byte	1byte	N byte	2 byte
Ex.	0x01	0x03	0x02	0x02 0xBC	0xB895

If response is 01,the command is wrong.
If response is 02,the address is not correct.
If response is 03,data number is not correct.

Baud rate：9600（regular）
Information：8
Parity：none
Stop bit：1
command 03: read the settings

03：definition
address
(00)　0x00　pH/ORP reading　　　　　　reading:pH X 0.01,　ORP X 1
(01)　0x01　pH/ORP current　　　　　　reading:X 0.01
(02)　0x02　Temperature　　　　　　　reading:X 0.1