

# AMMONIUM Controller

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## **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 ammonium, potassium, nitrates, chlorides and temperature, such as wastewater treatment, fishery, environmental monitoring, chemical fertilizer etc.

The instrument can be panel, wall or pipe mounted.

The instrument provides two current outputs. The maximum load is 500 Ohm.

The instrument provides 3 relays. It can pass though a maximum of 5 Amps at 250 VAC or 5 Amps at 30VDC.

## **Product content**

For 6000 series, the product package contains 1 instrument, the printed manual, 4 sets of holder.(fixed block, fixed bar, screw)

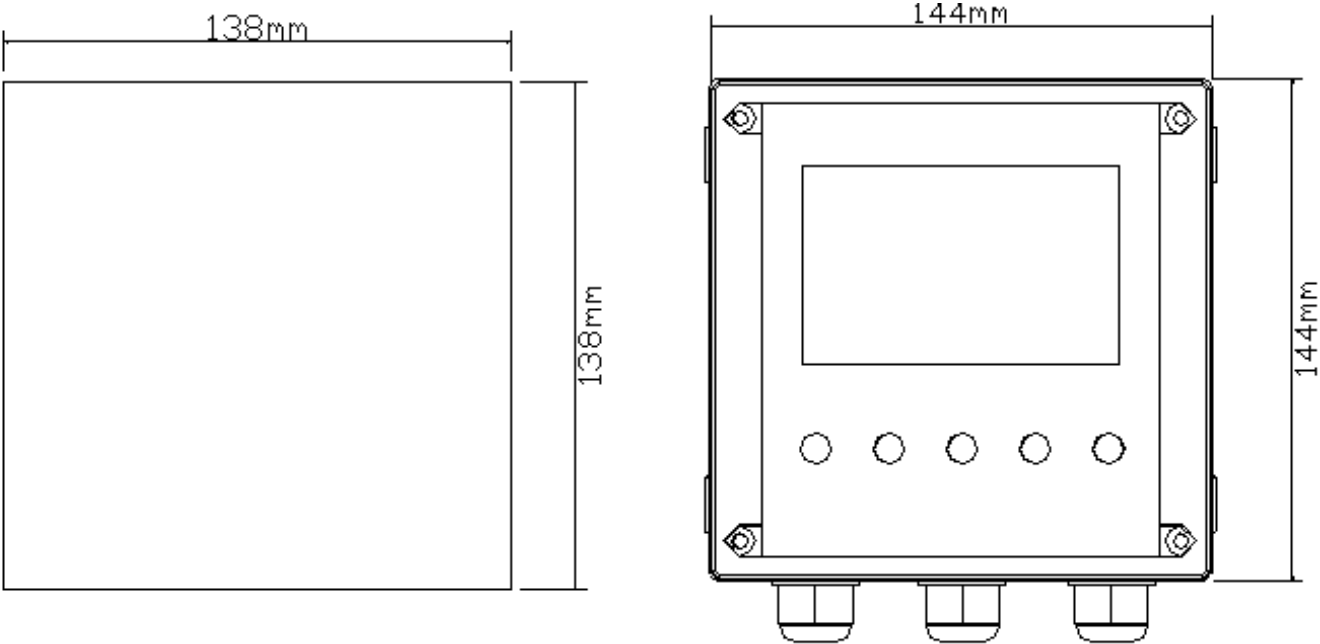
For 800 series, the product package contains 1 instrument, the printed manual, 2 holders

## Specifications

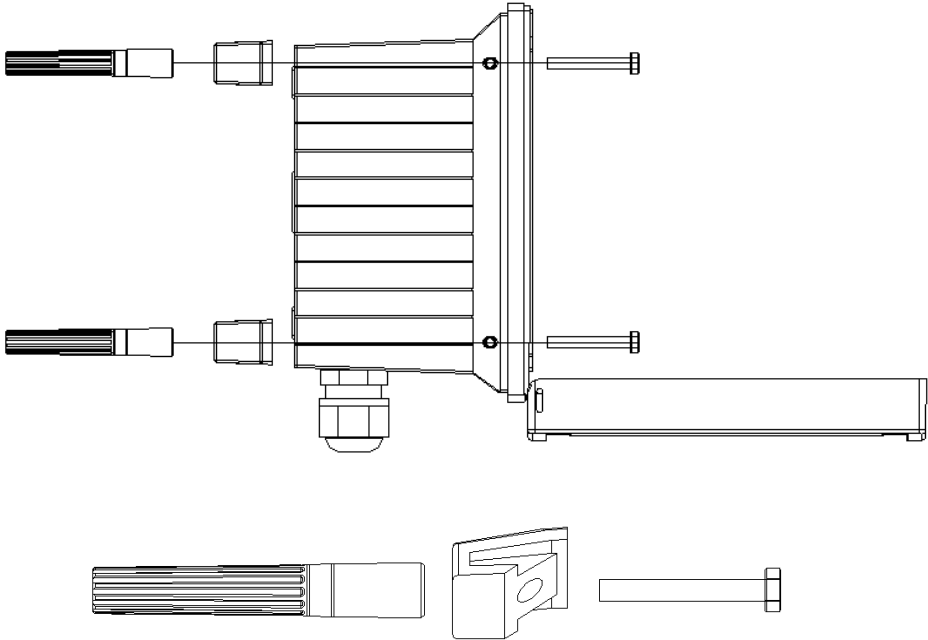
Functions	NH4	NO3	K+	CL-
Measuring range	0.0-100.0	0.0-100.0	0.0-1000.0	0.0-5000.0
Resolution	0.1	0.1	0.1	0.1
Accuracy	±1.0	±1.0	±1.0	±1.0
Temp. compensation	Pt100			
Temp. range	0.0 to +50.0°C			
Temp. compensation range	0.0 to +50.0°C			
Temp. resolution	0.1°C			
Temp. accuracy	±0.2°C			
Ambient temperature range	0 to +70°C			
Storage temp.	-20 to +70°C			
Display	Back light, dot matrix			
DO current output1	Isolated, 4 to 20mA output , max. load 500Ω			
Temp. current output 2	Isolated, 4 to 20mA output , max. load 500Ω			
Current output accuracy	±0.05 mA			
RS485	Mod bus RTU protocol			
Baud rate	9600/19200/38400			
Maximum relay contacts capacity	5A/250VAC,5A/30VDC			
Cleaning setting	ON: 1 to 1000 seconds, OFF: 0.1 to 1000.0 hours			
One multi function relay	clean/period alarm/error alarm			
Relay delay	0-120 seconds			
Data logging capacity	500,000			
Language selection	English/traditional Chinese/simplified Chinese			
Waterproof grade	IP65			
Power supply	From 90 to 260 VAC, power consumption < 5 watts			
Installation	panel/wall/pipe installation			
Weight	6000 series:0.85Kg/ 800 series:0.55Kg			

## Instrument installation

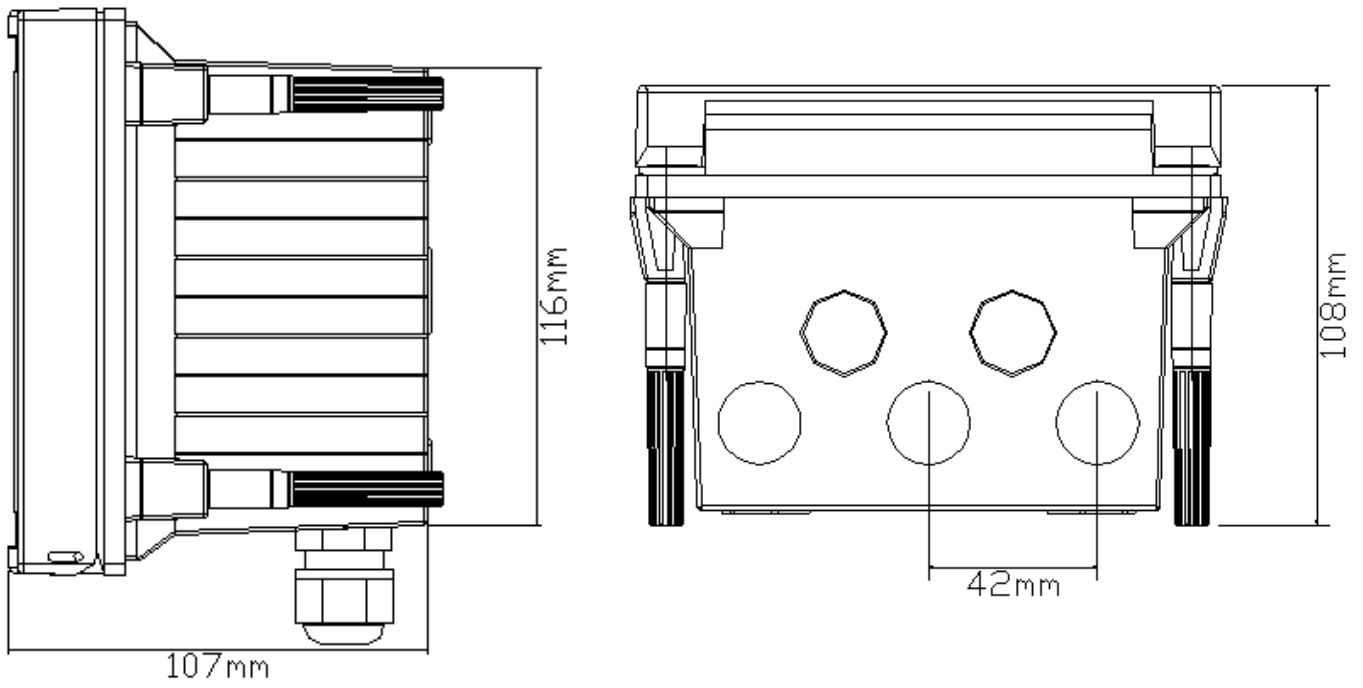
6000 series : The instrument can be panel, wall or pipe mounted installation.  
Panel Installation: Make a 138x138 mm square cutout and insert the instrument. Screw in the fixed block with the screws and fixed bar.



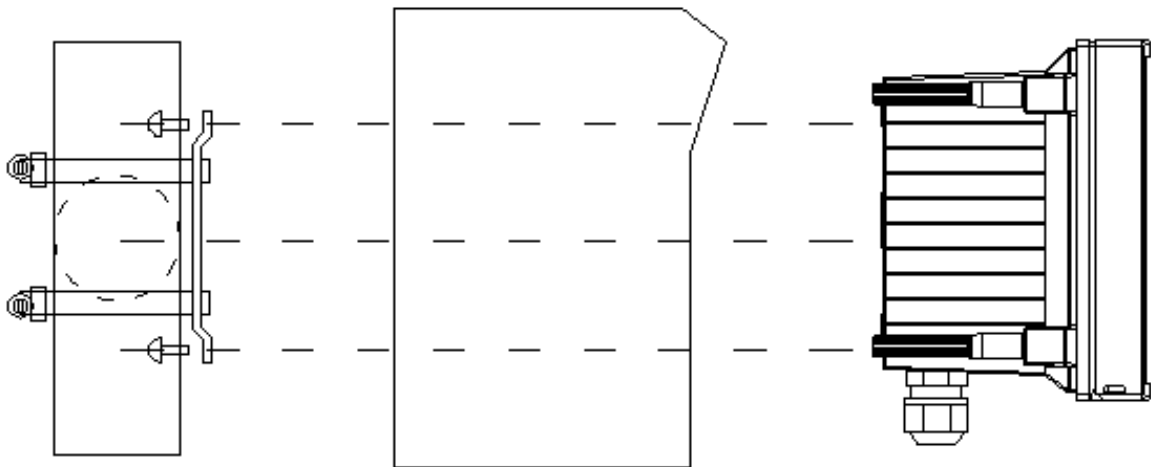
6000 series panel cutout size



6000 series installation figure



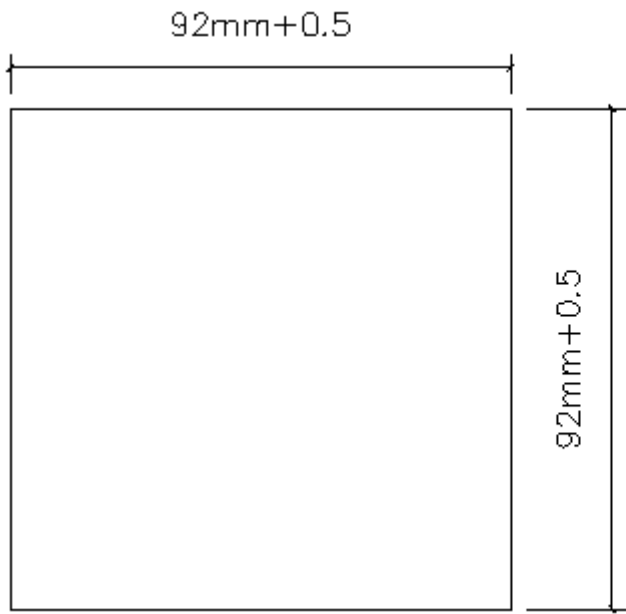
6000 series dimension



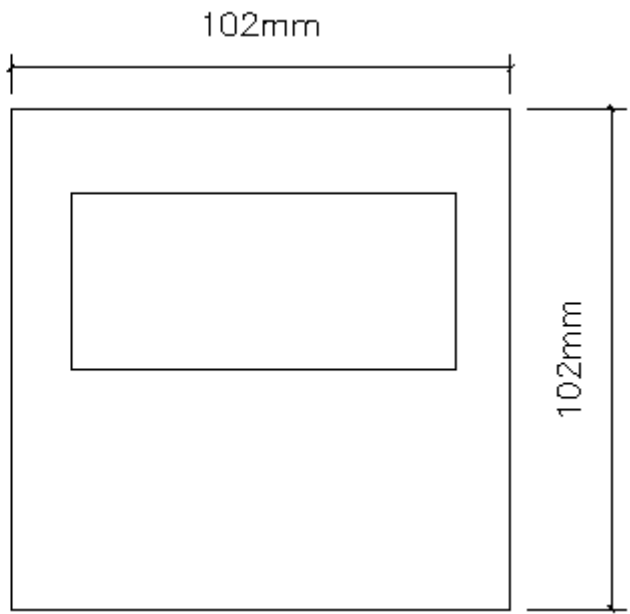
6000 series wall and pipe installation

800 series : The instrument can be panel, wall or pipe mounted installation.

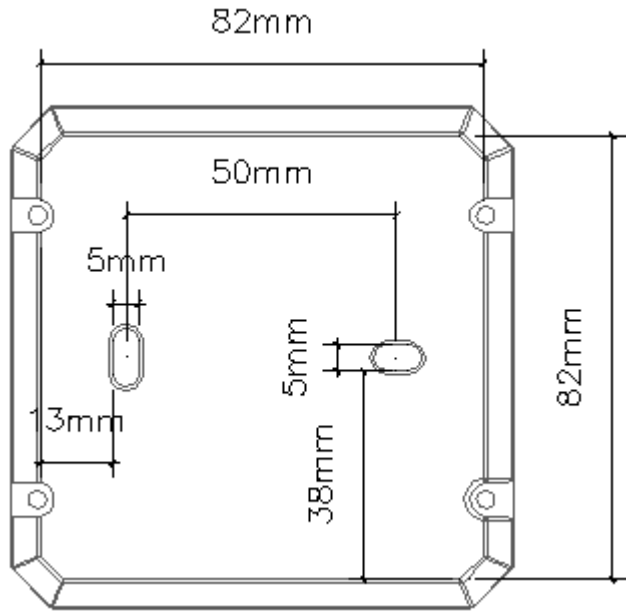
Panel Installation: Make a 92x92 mm square cutout and insert the instrument then screw in the fixed HOLDER.



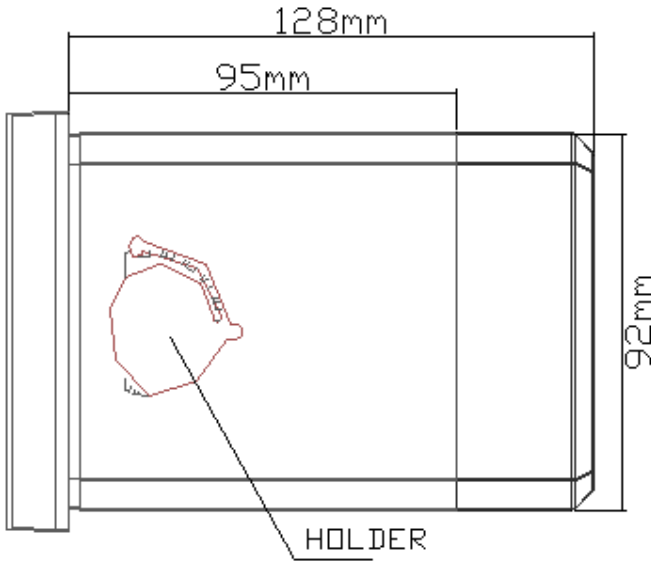
800 series panel cutout size



800 series front



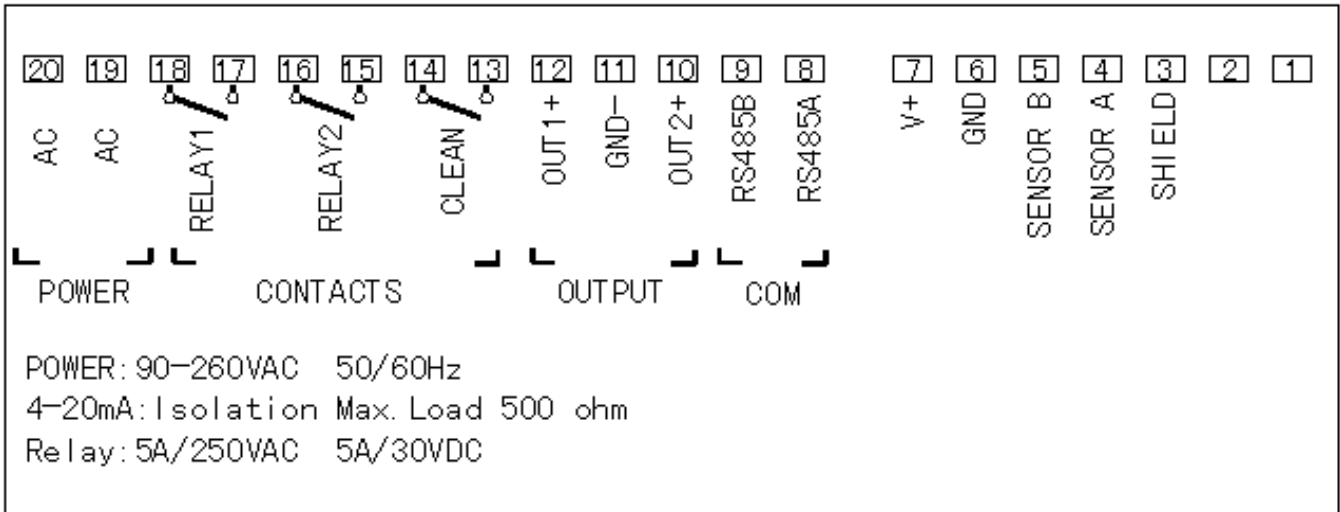
800 series back (for wall/pipe mounting)



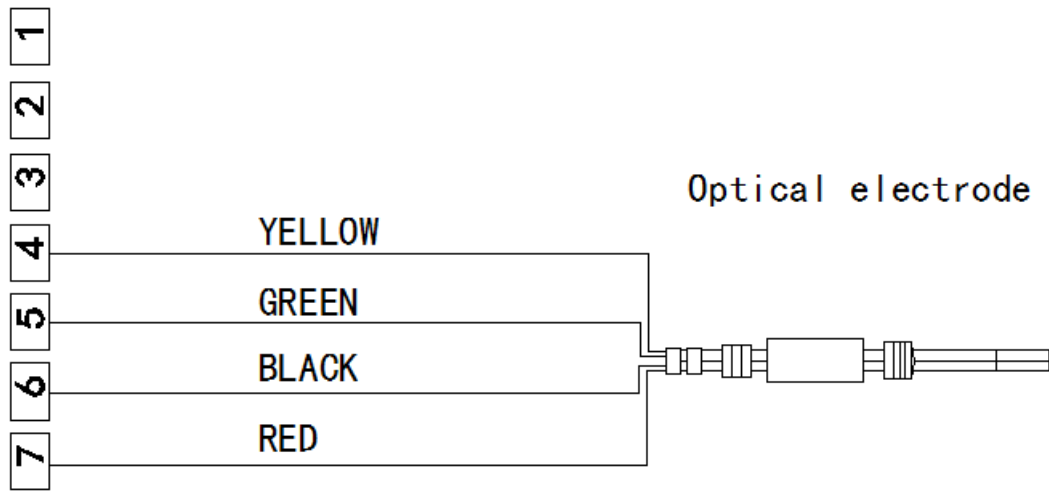
800 series dimension

**Connection label**

**6000 Series**

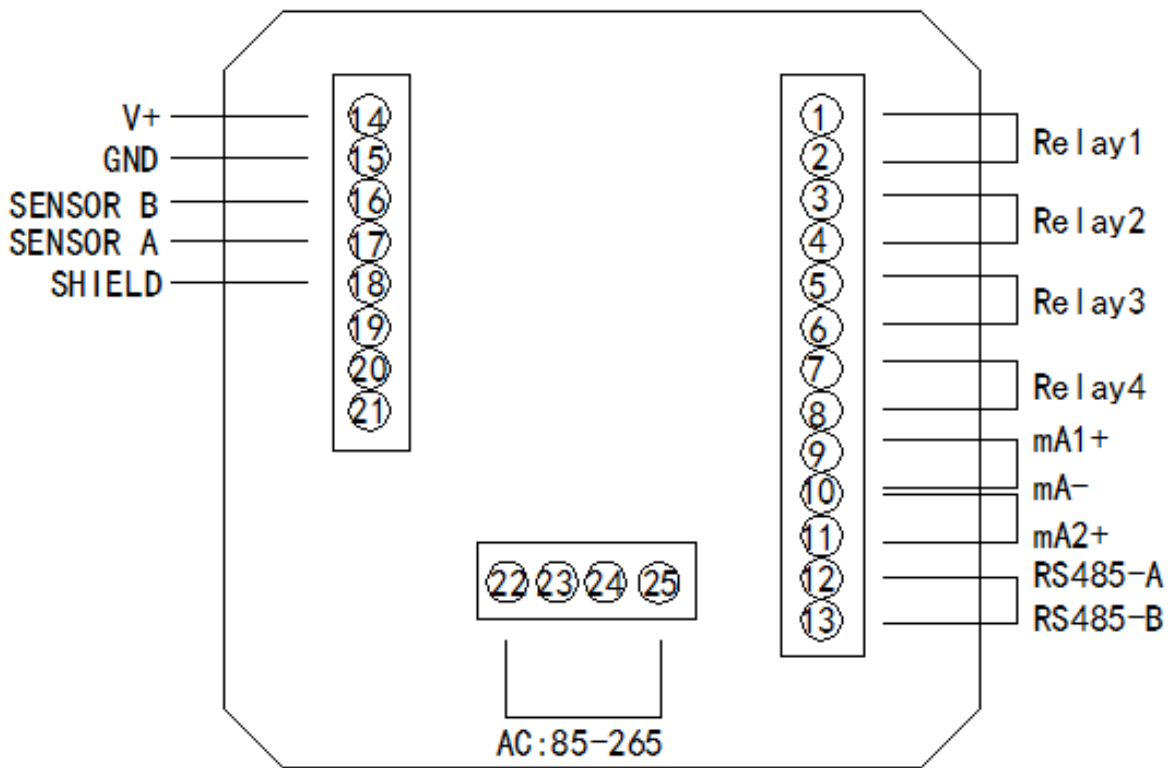


**Electrode connection figure**

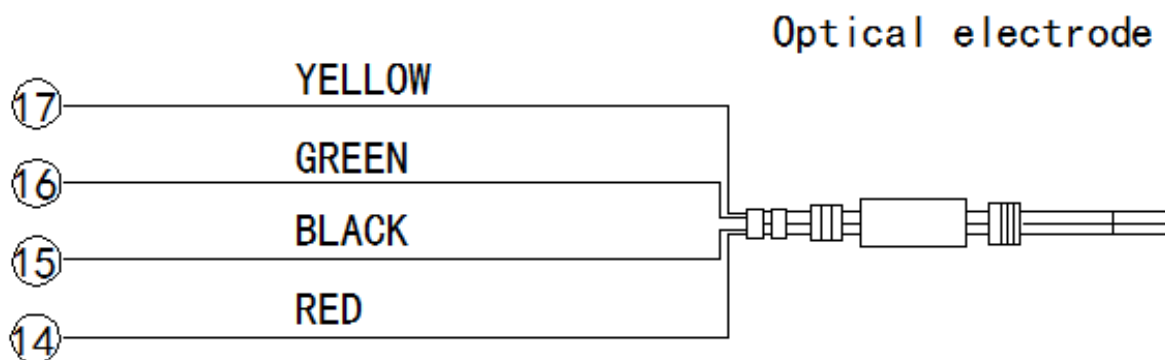




**800 Series**

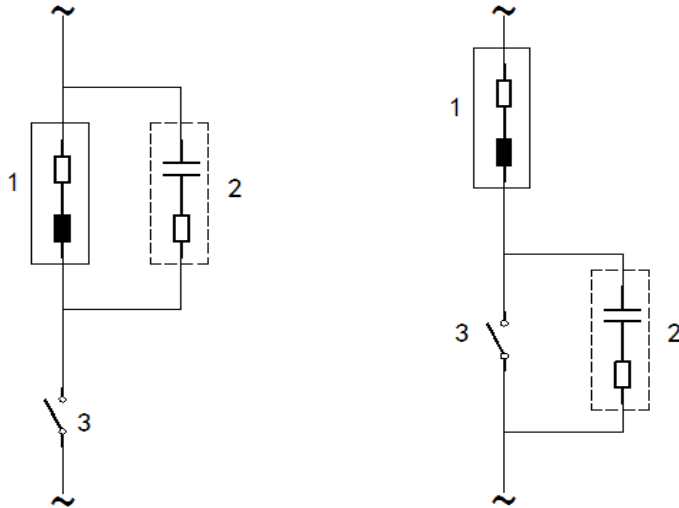


**Electrode connection figure**



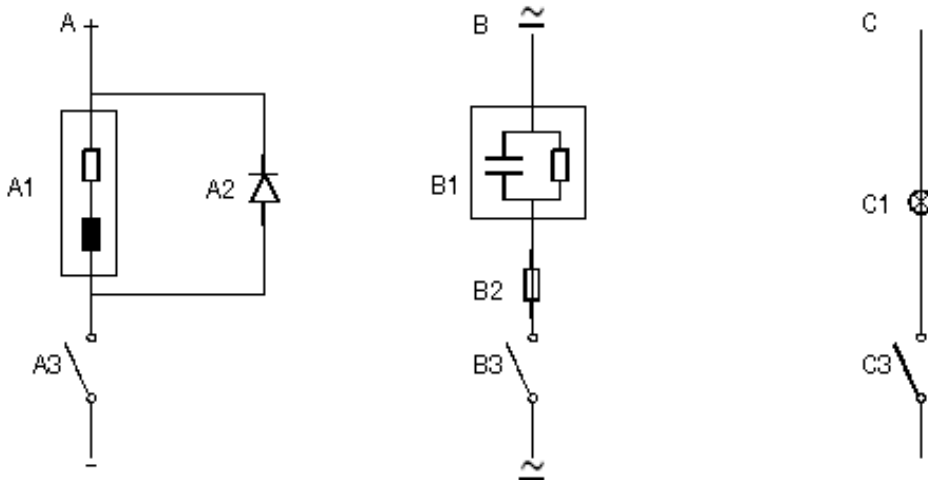
## Relay contact protection

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,  $R=100\ \text{ohm}$  1W,
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**

⑦ →	Measuring	2014-09-05 17:12:36		← ①
⑧ →	0000.1	NH4 =	1 0 0 . 0 ppm	← ②
		NO3 =	1 0 0 . 0 ppm	← ③
		K+ =	1 0 0 0 . 0 ppm	
		CL- =	5 0 0 0 . 0 ppm	
		Temp =	2 5 . 0 °C	← ④
⑨ →	R1 <input type="checkbox"/>	R2 <input type="checkbox"/>	R3 <input type="checkbox"/>	← ⑤
				← ⑥
			I1= 12.00 mA	
			I2= 12.00 mA	

1. Date and time
2. Main display
3. Unit
4. Temperature and unit
5. First current output
6. Second current output
7. Measurement status and Error indicator, there is no display if meter is in keeping mode
8. Count down timer: cycle time/clean time, it also displays the “delay” when relay3 has a delay enabled.
9. Relay indicator

## Key



MODE



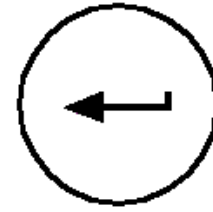
SHIFT



UP



DOWN



ENTER

Key name	Meas. status	Setting status	Cal. status	Record status
MODE	Enter password	Exit	Exit	Exit
SHIFT	none	Move digit	Mode digit	Mode digit
UP	Enter record	Inc	Inc	Inc
DOWN	None	Dec	Dec	Dec
ENTER	ON/OFF back light	Enter	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 opened (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 from the above mentioned 4 modes then left keeping mode.

The instrument will go into the keeping mode when turn on the power.

Current output in keeping mode:

User has two choices: fixed current output or last current output.

Fixed current: User can set the output current from 4.00 to 20.00mA when instrument goes into keeping mode.

Last current: User can set the output current keep at the last current when Instrument goes into keeping mode.

Relays in keeping mode: All relays are opened.(inactive)

## **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.

PASSWORD
0 0 0 0

PASSWORD
1 2 0 0

## **Main display**

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

CONF I G U R A T I O N
<ul style="list-style-type: none"><li>■ Current1 Settings</li><li><input type="checkbox"/> Current2 Settings</li><li><input type="checkbox"/> Relay1 Settings</li><li><input type="checkbox"/> Relay2 Settings</li><li><input type="checkbox"/> Relay3 Settings</li><li><input type="checkbox"/> Measurement Settings</li><li><input type="checkbox"/> Temperature Settings</li><li><input type="checkbox"/> RS485 Settings</li></ul>

Page1

CONF I G U R A T I O N
<ul style="list-style-type: none"><li>■ Date Settings</li><li><input type="checkbox"/> Data Log Settings</li><li><input type="checkbox"/> Output Test</li><li><input type="checkbox"/> Language Settings</li><li><input type="checkbox"/> Reset Parameters</li></ul>

Page2

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 1 settings

CURRENT 1 SETTINGS	
4.00 mA	= 00.0 ppm
20.00 mA	= 100.0 ppm
Offset	= +0.00 mA
Filter Time	= 000 SEC
HOLD Type	= <input type="checkbox"/> Fixed 04.00 mA <input type="checkbox"/> Last

1. Set the corresponding 4.00mA to ammonium.
2. Set the corresponding 20.00mA to ammonium, the difference between 4.00mA and 20.00 mA at least is 10.0.
3. Set the offset current of ammonium ,the range is  $\pm 1.00$ mA.
4. The filter time range is 0-120 seconds, the low pass filter of software will active when the current from one point to another

point if user sets the filter time.

5. Set the current 1 output mode(fixed / last) when instrument enter into keeping mode.

### Current 2 settings

CURRENT 2 SETTSINGS	
4.00 mA	= 00.0 °C
20.00 mA	= 40.0 °C
Offset	= +0.00 mA
Filter Time	= 000 SEC
HOLD Type	= <input type="checkbox"/> Fix 04.00 mA <input type="checkbox"/> Last

1. Set the corresponding 4.00mA to temperature.
2. Set the corresponding 20.00mA to temperature, the difference at least between 4.00mA and 20.00 mA is 10.0°C .
3. Set the offset current of temperature, the range is  $\pm 1.00$ mA.
4. The filter time range is 0-120 seconds, the low pass filter of software will active when

the current from one point to another point if user sets the filter time.

5. Set the current 2 output mode(fixed / last) when instrument enter into keeping mode.

### Relay 1 settings

RELAY 1 SETTINGS	
ON/OFF	= <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
Close S.P.	= 080.0 ppm
Open S.P.	= 020.0 ppm
Delay Time	= 000 SEC

1. Press UP/DOWN key to ON/OFF (enable/disable) relay1.
2. Close set point: active point for ammonium.
3. Open set point: inactive point for ammonium.
4. Delay time: the range is 0-120 seconds. Relay needs to delay first then active if the measuring data is reach to close set point.

Ex: If user wants turn on the pump at 80.0ppm and turn off it at 20.0ppm, then the close S.P. needs to set to 80.0ppm, Open S.P. sets to 20.0ppm.

## Relay 2 settings

RELAY 2 SETTINGS	
ON/OFF	= <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
Close S. P.	= 0 2 0 . 0 ppm
Open S. P.	= 0 8 0 . 0 ppm
Delay Time	= 0 0 0 SEC

1. Press UP/DOWN key to ON/OFF (enable/disable) relay2.
2. Close set point: active point for ammonium.
3. Open set point: inactive point for ammonium.
4. Delay time: the range is 0-120 seconds. Relay needs to delay first then active if the measuring data is reach to close set point.  
Ex: If user wants turn on the pump at 20.0ppm

and turn off it at 80.0ppm, then the close S.P. needs to set to 20.0ppm, Open S.P. sets to 80.0ppm.

## Relay 3 settings

RELAY 3 SETTINGS	
ON/OFF	= <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
Period Time	= 0 0 0 1 . 0 HOUR
Clean Time	= 0 0 1 0 SEC
Delay Time	= 0 0 0 SEC
Function	= <input type="checkbox"/> Rinsing <input type="checkbox"/> Interval Alarm <input type="checkbox"/> Error Alarm

1. Press UP/DOWN key to ON/OFF (enable/disable) relay3.
2. Period time: The period for Rinsing or interval function.
3. Clean time: When period is timeout then relay active.
4. Delay time: the range is 0-120 seconds. Relay needs to delay first then active if the period is timeout.

5. Function: press UP/DOWN key to choose Rinsing/Interval/Error.

### Notice:

1. Rinsing: when period timeout then clean-relay will active, when clean time is timeout the repeat count for the period.
2. Interval alarm: When period timeout then clean-relay active until user resets the interval then the clean-relay inactive and repeat count for the period.
3. Error alarm: The clean-relay active when there is a error produce. No delay time function in this mode.

## Measurement settings

MEASUREMENT SETTINGS	
Mode	= <input checked="" type="checkbox"/> NH4 <input type="checkbox"/> NO3 <input type="checkbox"/> K+ <input type="checkbox"/> CL-
Unit	= <input type="checkbox"/> ppm <input type="checkbox"/> mg/L
Offset	= + 0 0 . 0 ppm

1. Choose the output mode for Current1 ,Relay1 and Relay, press UP/DOWN key to choose.
2. Choose the unit, press UP/DOWN key to choose.
3. Offset , range is±10.0

## Temperature settings

TEMPERATURE SETTINGS	
Offset	= + 0 . 0 °C
Display	= <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

1. Temperature offset ,the range is±5.00°C.
2. Temperature display: display the temperature on measurement mode or not.

## RS485 settings

RS485 SETTINGS	
ID Address	= 0 0 1
Baud Rate	= <input type="checkbox"/> 9600 = <input type="checkbox"/> 19200 = <input type="checkbox"/> 38400

1. ID address: 1-255.
2. Baud rate ,press UP/DOWN key to choose.



## Date settings

DATE SETTINGS	
Year	= 2 0 1 5
Month	= 0 8
Day	= 1 5
Hour	= 1 3
Minute	= 3 6
Second	= 0 4

Press UP/DOWN key to set the date. When power off the date will be kept for around 2 days.

## Data log settings

DATE LOG SETTINGS	
ON/OFF	= <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
Display Type	= <input type="checkbox"/> Record <input type="checkbox"/> XY Chart
Reset Record	= <input type="checkbox"/> Yes <input type="checkbox"/> No
Save Period	= 0 6 0 SEC

1. Press UP/DOWN key to ON/OFF (enable/disable) this function.
2. Display type, press UP/DOWN key to choose
3. Erase all the records.
4. Saving period from 5 to 120 second.

Notice:

1. When user chooses ON, then it will save measuring data follow the save period time.
2. Display type: Record, display the detail of record(5 records in one page), XY chart, display a chart.(150 records in one page)
3. When reset the records, it will spend around 10 seconds.

## Output test

OUTPUT TEST	
Current1	= 0 4 . 0 0 mA
Current2	= 0 4 . 0 0 mA
Relay1	= <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN
Relay2	= <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN
Relay3	= <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN

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

Notice: This function for testing the output only.

### Language settings

LANGUAGE SETTSINGS	
Language	= <input checked="" type="checkbox"/> English <input type="checkbox"/> 繁體中文 <input type="checkbox"/> 简体中文

Press UP/DOWN key to choose the language.

### Reset parameters

RESET PARAMETERS	
Reset Type	= <input checked="" type="checkbox"/> Current <input type="checkbox"/> Relay1 <input type="checkbox"/> Relay2 <input type="checkbox"/> Relay3 <input type="checkbox"/> All

Press UP/DOWN key to choose the reset.

Notice: The reset will not affect the calibrated parameters.

### Record query

Press UP key at the measurement mode to enter record query mode.

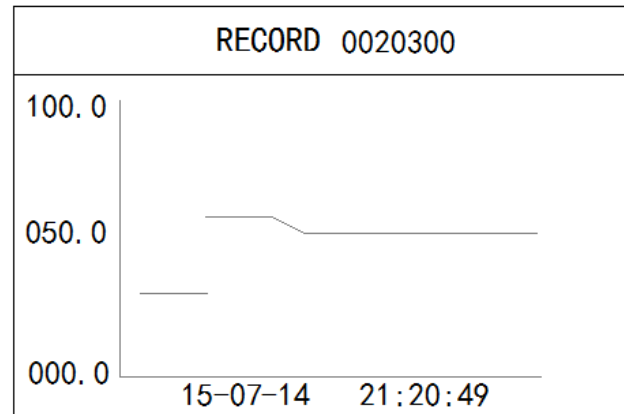
INPUT RECORD START NUMBER
0 1 0 3 0 <b>0</b>

Press UP/DOWN and SHIFT key to input record number then press ENTER key enter or press MODE key exit.

### Display record at record

RECORD 0020300		
15-08-14	065.0	ppm
21:20:49	025.0	°C
15-08-14	066.0	ppm
21:20:59	025.0	°C
15-08-14	067.9	ppm
21:21:09	025.0	°C
15-08-14	069.9	ppm
21:21:19	025.0	°C
15-08-14	070.0	ppm
21:21:29	025.0	°C

### Display record at XY chart



### 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.

PASSWORD
0 0 0 0

PASSWORD
1 1 0 0

### Manu

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

CALIBRATION
<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> NH4 Offset Calibration</li> <li><input type="checkbox"/> NO3 Offset Calibration</li> <li><input type="checkbox"/> K+ Offset Calibration</li> <li><input type="checkbox"/> CL- Offset Calibration</li> <li><input type="checkbox"/> Reset Parameters</li> </ul>

1. Ammonium offset calibration, range:0 to ±2500
2. Nitrates offset calibration,range:0 to± 2500
3. Potassium offset calibration, range:0 to± 2500
4. Chlorides offset calibration,range:0 to± 2500
5. Reset the parameters.

## Ammonium offset calibration

NH4 CALIBRATION	
NH4	= + 0 1 0 0 mV
Input Offset Data	

By nature of the ISE electrodes, which tend to arise, then we recommend a check and a realignment of reading every 20 days. To do this, you simply change only the offset value in mV.

## Default

NH4 20.00mA	corresponding	100.0	ppm	range: 10.0 - 100.0
NH4 4.00mA	corresponding	0.0	ppm	range: 0.0 - 90.0 difference : 10.0
NO3 20.00mA	corresponding	100.0	ppm	range: 10.0 - 100.0
NO3 4.00mA	corresponding	0.00	ppm	range: 0.0 - 90.0 difference : 1.00
K+ 20.00mA	corresponding	1000.0	ppm	range: 10.0 - 1000.0
K+ 4.00mA	corresponding	0.0	ppm	range: 0.0 - 990.0 difference : 10.0
CL- 20.00mA	corresponding	5000.0	ppm	range: 10.0 - 5000.0
CL- 4.00mA	corresponding	0.00	ppm	range: 0.0 - 4990.0
Temp. 20.00mA	corresponding	50.0	°C	range: 10.0 - 50.0
Temp. 4.00mA	corresponding	0.0	°C	range: 0.0 - 40.0 difference : 10.0
Current 1 output offset		0.00	mA	range: +/- 1.00
Current 2 output offset		0.00	mA	range: +/- 1.00
Current 1 filter		0	second	range: 0 - 120
Current 2 filter		0	second	range: 0 - 120
Current 1 fixed output		4.00	mA	range: 4.00 - 20.00
Current 2 fixed output		4.00	mA	range: 4.00 - 20.00
Current 1 HOLD type		last		range: fixed/last
Current 2 HOLD type		last		range: fixed/last
Relay 1 NH4 close S.P.		80.0	ppm	range: 0.0 - 100.0
Relay 1 NH4 open S.P.		20.0	ppm	range: 0.0 - 100.0 difference : 0.1
Relay 1 NO3 close S.P.		80.0	ppm	range: 0.0 - 100.0
Relay 1 NO3 open S.P.		20.0	ppm	range: 0.0 - 100.0

Relay 1 K+ close S.P.	80.0	ppm	difference : 0.1 range: 0.0 - 1000.0
Relay 1 K+ open S.P.	20.0	ppm	range: 0.0 - 1000.0 difference : 0.1
Relay 1 CL- close S.P.	80.0	ppm	range: 0.0 - 5000.0
Relay 1 CL- open S.P.	20.0	ppm	range: 0.0 - 5000.0 difference : 0.1
Relay 1 delay time	0	second	range: 0 - 120
Relay 2 NH4 close S.P.	80.0	ppm	range: 0.0 - 100.0
Relay 2 NH4 open S.P.	20.0	ppm	range: 0.0 - 100.0 difference : 0.1
Relay 2 NO3 close S.P.	80.0	ppm	range: 0.0 - 100.0
Relay 2 NO3 open S.P.	20.0	ppm	range: 0.0 - 100.0 difference : 0.1
Relay 2 K+ close S.P.	80.0	ppm	range: 0.0 - 1000.0
Relay 2 K+ open S.P.	20.0	ppm	range: 0.0 - 1000.0 difference : 0.1
Relay 2 CL- close S.P.	80.0	ppm	range: 0.0 - 5000.0
Relay 2 CL- open S.P.	20.0	ppm	range: 0.0 - 5000.0 difference : 0.1
Relay 2 delay time	0	second	range: 0 - 120
Relay 3 period time	1.0	hour	range: 0 - 1000.0
Relay 3 clean time	10	second	range: 0 - 1000
Relay 3 delay time	0		range: 0 - 120
Relay 3 function	error alarm		range: clean/period alarm/ error alarm
Record period	60	second	range: 5 - 120
ID address	1		range: 1 - 255
Baud rate	9600		range: 9600,19200,38400
NH4 offset	0.0	ppm	range: +/- 10.0
NO3 offset	0.0	ppm	range: +/-10.0
K+ offset	0.0	ppm	range: +/- 10.0
CL- offset	0.0	ppm	range: +/-10.0
Mode	NH4		range: NH4,NO3,K+,CL-
Unit	mg/L		range: mg/L, ppm
Temp. Offset	0.0	°C	range: +/- 5.0
Language	English		range: English/ traditional Chinese /simple Chinese
Record type	record		range: record/XY chart

## 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.

## Error code

Error 01	memory error
Error 02	reading is over maximum
Error 03	reading is under minimum
Error 04	temperature is over maximum
Error 05	temperature is under minimum
Error 06	current 1 output is over 20.5 mA,the maximum is 22.00mA
Error 07	current 1 output is under 3.8 mA, the minimum is 3.5mA
Error 08	current 2 output is over 20.5 mA,the maximum is 22.00mA
Error 09	current 2 output is under 3.8 mA, the minimum is 3.5mA
Error 10	record error
Error 11	ADC damage
Error 99	default parameters lost

## RS485 command

The instrument use the standard Modbus-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.

command 03: read the settings

command 04: read the readings

#### 04:definition

##### address

(00)	0x00	NH4 reading	reading: X 0.1
(01)	0x01	NO3 reading	reading: X 0.1
(02)	0x02	K+ reading	reading: X 0.1
(03)	0x03	CL- reading	reading: X 0.1
(04)	0x04	NH4/NO3/K+/CL- current	reading: X 0.01
(05)	0x05	Temperature reading	reading: X 0.1
(06)	0x06	Temperature current	reading: X 0.01
(07)	0x07	Error code	reading: X 1
(08)	0x08		
(09)	0x09	Model type	fix to 13

#### 03: Definition

##### Address

(00)	0x00	NH4 20.00mA corresponding	reading:X0.1
(01)	0x01	NH4 4.00mA corresponding	reading:X0.1
(02)	0x02	NO3 20.00mA corresponding	reading:X0.1
(03)	0x03	NO3 4.00mA corresponding	reading:X0.1
(04)	0x04	K+ 20.00mA corresponding	reading:X0.1
(05)	0x05	K+ 4.00mA corresponding	reading:X0.1
(06)	0x06	CL- 20.00mA corresponding	reading:X0.1
(07)	0x07	CL- 4.00mA corresponding	reading:X0.1
(08)	0x08	Temp. 20.00mA corresponding	reading:X0.1
(09)	0x09	Temp. 4.00mA corresponding	reading:X0.1
(10)	0x0A	Current 1 offset	reading:X0.01
(11)	0x0B	Current 2 offset	reading:X0.01
(12)	0x0C	Current 1 filter	reading:X1
(13)	0x0D	Current 2 filter	reading:X1
(14)	0x0E	Current 1 fixed current	reading:X0.01
(15)	0x0F	Current 2 fixed current	reading:X0.01
(16)	0x10	Current 1 HOLD type	reading:X1 0=fixed,1=last
(17)	0x11	Current 2 HOLD type	reading:X1 0=fixed,1=last
(18)	0x12	Relay1 NH4 close S.P.	reading:X0.1
(19)	0x13	Relay1 NH4 open S.P.	reading:X0.1
(20)	0x14	Relay1 NO3 close S.P.	reading:X0.1
(21)	0x15	Relay1 NO3 open S.P.	reading:X0.1
(22)	0x16	Relay1 K+ close S.P.	reading:X0.1

(23)	0x17	Relay1 K+ open S.P.	reading:X0.1	
(24)	0x18	Relay1 CL- close S.P.	reading:X0.1	
(25)	0x19	Relay1CL- open S.P.	reading:X0.1	
(26)	0x1A	Relay1 delay time	reading:X1	
(27)	0x1B	Relay2 NH4 close S.P.	reading:X0.1	
(28)	0x1C	Relay2 NH4 open S.P.	reading:X0.1	
(29)	0x1D	Relay2 NO3 close S.P.	reading:X0.1	
(30)	0x1E	Relay2 NO3 open S.P.	reading:X0.1	
(31)	0x1F	Relay2 K+ close S.P.	reading:X0.1	
(32)	0x20	Relay2 K+ open S.P.	reading:X0.1	
(33)	0x21	Relay2 CL- close S.P.	reading:X0.1	
(34)	0x22	Relay2 CL- open S.P.	reading:X0.1	
(35)	0x23	Relay2 delay time	reading:X1	
(36)	0x24	Relay3 clean period	reading:X0.1	
(37)	0x25	Relay3 clean time	reading:X1	
(38)	0x26	Relay3 delay time	reading:X1	
(39)	0x27	Relay3 function	reading:X1	0:clean,1:period alarm ,2:Error alarm
(40)	0x28	Record period	reading:X1	
(41)	0x29	Mode	reading:X1	0=NH4,1=NO3,2=K+,3=CL-
(42)	0x2A	Unit	reading:X1	0-ppm,1=mg/L
(43)	0x2B	NH4 offset	reading:X0.1	
(44)	0x2C	NO3 offset	reading:X0.1	
(45)	0x2D	K+ offset	reading:X0.1	
(46)	0x2E	CL- offset	reading:X0.1	
(47)	0x2F	Temp. offset	reading:X0.1	
(48)	0x30	Language	reading:X1	0=English ,1=traditional Chinese,2=simple Chinese