User's Manual

Supmea

Dissolved oxygen controller

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Supmea Automation Co.,Ltd.

U-SUP-DM3000/DM2800-EN1

Preface

Thank you for purchasing Dissolved oxygen controller. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version

U-SUP-DM3000/DM2800-EN1

Safety Precautions

In order to use this product safely, be sure to follow the safety precautions described.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

Precautions for protection, safety and modification of this product

- To ensure safe use of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety.Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment.If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.

- Do not modify this product.
- The following safety signs are used in this manual:

Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.

Warning:Pay special attention to the important information linked to product or particular part in the operation manual.

- Confirm if the supply voltage is in consistent with the rated voltage before operation.
- Don’t use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzine or other organic solvents. Prevent all kinds of liquid from splashing on the product. If the product falls into the water, please cut off the power immediately, otherwise there will be leakage, electric shock or even a fire

accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.

- Don’t use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, startup, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact the company in time.

Disclaimer

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

No.	Name	Quantity	Note
1	Dissolved oxygen controller	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation.If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

Content

Chapter 1 Introduction

Dissolved oxygen online controller, is widely applied for continuous monitoring and measurement of dissolved oxygen, saturation, oxygen partial pressure and temperature in the solution in the industry of thermal power, chemical fertilizer, environmental protection, metallurgy, pharmacy, biochemistry, food and water, etc. Continuous monitoring measurement data is connected with the recorder via transmitting output to realize remote monitoring and recording. It can also be connected with RS485 portal via MODBUS-RTU protocol to access computer for monitoring and recording.

1.1 Characteristics

- Module design of the circuits.
- Isolating transmitting output.
- Isolating RS485 communication.
- DO, saturation and temperature measurement.
- Air calibration.
- Manual and auto temperature compensation.
- High/low alarm.
- LCD backlight switch.

1.2 Parameter

Model	DM3000	DM2800
Display	2.8-inch monochrome LCD screen, resolution 128*64	
Dimension	Overall dimension: 100mm * 100mm * 150mm Cutout dimension: 92.5mm*92.5mm	
Thickness of the installation panel	1.5mm～13mm	
Weight	0.65kg	
Measuring valuables	DO、Saturation	DO, Saturation, Oxygen partial pressure
Measuring range	DO:(0～40)mg/L Saturation: 0～130%	DO:(0 ~ 20)mg/L Saturation: 0~200% Oxygen partial pressure: (0 ~ 400)hPa Temperature:(- 10 ~ 60) ℃
Accuracy	±0.5mg/L	DO/saturation/oxygen partial pressure: ±1.5%F.S
Temperature accuracy	±0.5℃	NTC10K: plus or minus 0.5 ℃ PT1000: plus or minus 0.5 ℃
Output	(4~20)mA output, maximum loop is 750Ω,±0.2%FS	
Communication protocol	Isolated, MODBUS-RTU RS485	
Alarm relay	Pickup/Breakaway AC250V/3A	
Relative humidity	10%RH～85%RH（No condensation）	
Operating temperature	0℃～60℃	
Power supply	AC220V±10%, 5W Max, 50Hz	
Storage conditions	Temperature: -15℃~65℃ Relative humidity: 5%~95%RH (No condensation) Altitude:<2000m	
Temperature compensation	NO temp. compensation in controller.but sensors comes with temp. compensation	NTC10K/PT1000 Automatic /Manual temperature compensation
Ingress protection	IP54	

Chapter 2 Installation

2.1. Instrument installation

The installation site and method of the instrument are explained, the part shall be carefully read during the installation.

Notes for installation

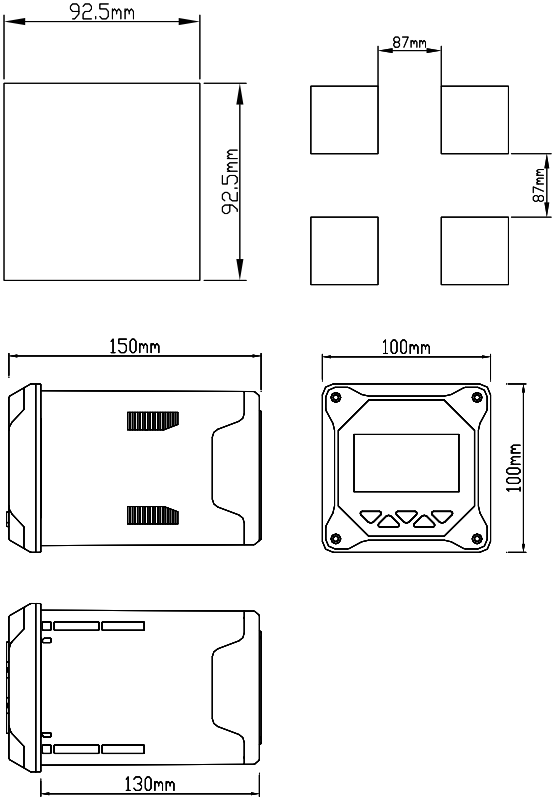
- The instrument is panel mounted.
- It shall be installed inside the building so as to avoid wind and rain as well as direct sunlight.
- Please install it at the place with good ventilation in order to prevent the internal temperature of the instrument from rising.
- Don't lean to left or right when the instrument is installed, horizontal installation shall be realized as possible (tilting back<30°).

The following places shall be avoided during the installation

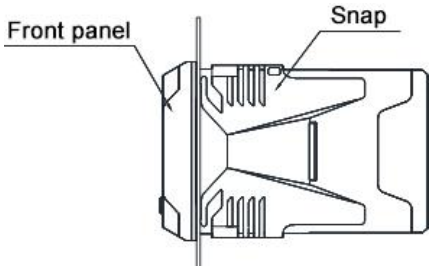
- The place where the environment temperature exceeds 60℃ during the work.
- The place where the environment humidity exceeds 85% during the work.
- The vicinity of the electromagnetic occurring sources.
- The sites with strong mechanical vibration.
- The site where the temperature is changed a lot and the moisture condensation is easily formed.
- Places with lots of lampblack, steam, moisture, dust and corrosive gas.

2.2. Installation

92.5mm*92.5mm (H*W) installation hole is opened at the instrument cabinet or installation panel (the dimension is 100*100*150mm (H*W*D)).



The instrument into the mounting hole and then buckle on the snap, as shown below

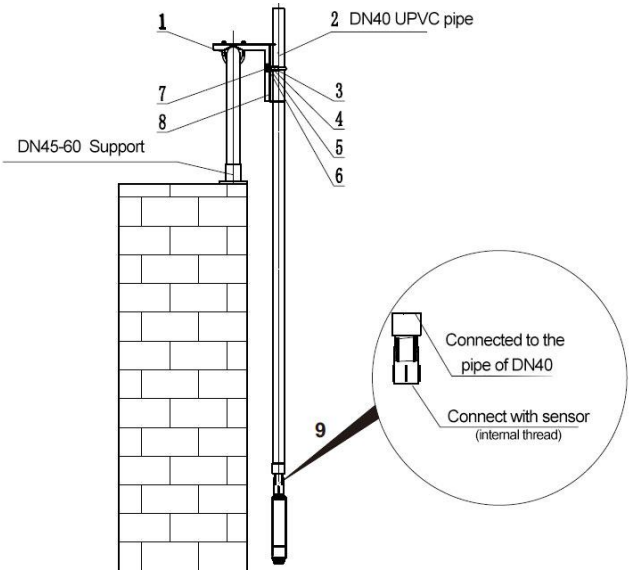


2.3. Electrode installation

The installation steps for the sensor as follow:

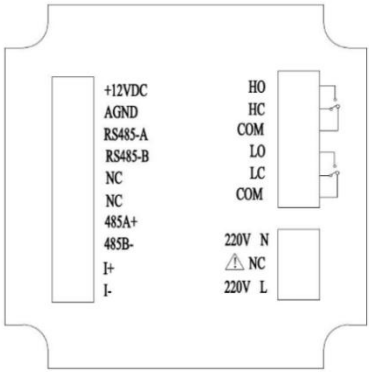
1. Use 1 (M8U buckle) to fixing 8 (installation panel) on the railing by pool near the installation point of the sensor；
2. Use glue to connect 9 (connector) and 2 (DN40) PVC pipe, and let sensor cable run through PVC pipe, connect the sensor and make sure that water proof has been done correctly.
3. Using 4 (DN42 U shape clip) to fixing 2 (DN40 pipe) on 8 (installation panel), as picture show below.

1- M8 U clamp（DN60）	2- DN40 UPVC pipe
3- M6*120 Bolt	4- DN42 U clamp
5- M8 washeer（8*16*1)	6- M8 washer（8*24*2)
7- M8 spring washer	8- installation panel
9- Threaded Adapter	



2.4. Wiring

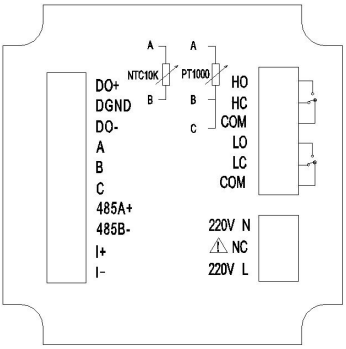
- **DM3000**



Identification of terminal

- +12VDC: Dissolved oxygen sensor +
- AGND: Dissolved oxygen sensor -
- RS485-A: Dissolved oxygen sensor communication +
- RS485-B: Dissolved oxygen sensor communication -
- NC: Null
- NC: Null
- 485A+: RS485 communication interface A+
- 485B-: RS485 communication interface B -
- I+: 4~20mA output +
- I -: 4~20mA output -
- HO: High alarm normally open
- HC: Low alarm normally closed
- COM: Common terminal
- LO: Low alarm normally open
- LC: Low alarm normally closed
- COM: Common terminal
- 220V L: AC220V live wire
- NC: Null
- 220V N: AC220V neutral wire

- **DM2800**



Identification of terminal

- DO+: Dissolved oxygen electrode anode
- DGND: Dissolved oxygen electrode shield wire
- DO-: Dissolved oxygen electrode cathode
- A: Temperature compensation terminal A, NTC10K A or PT1000 A
- B: temperature compensation terminal B, NTC10K B or PT1000 B
- C: Temperature compensation terminal C, short-circuit terminal, PT1000 three-wire system, short-circuit of PT1000 two-wire system to B, NTC10K does not need to be connected to C
- 485A+: RS485 communication output terminal A+
- 485B-: RS485 communication output terminal B-
- I+: (4～20)mA output terminal+
- I-: (4～20)mA output terminal-
- HO: High alarm normally open relay
- HC: High alarm normally closed relay
- COM: Common terminal
- LO: Low alarm normally open relay
- LC: Low alarm normally closed relay
- COM: Common terminal
- 220V N: AC 220V neutral line
- NC: Null

- 220V L: AC 220V live wire

Attention

- Confirm that the instrument is not power on before connected with signal wire, to avoid electric shock.
- Use double insulation wire to prevent fire accident.
- Do not put electric product close to signal terminal, which may cause failure.

Chapter 3 Navigation keys

3.1. Button display

3.2. Definition of buttons

Sign	Button name	Key function
	EXIT	Under "Monitoring interface" - Alarm view Under "Menu interface" - Return to the previous interface
	RIGHT	Make a recurrent selection of digit of parameters modify the original indication value
	MENU	Under “Monitoring interface” - Enter the MENU Under “Menu interface” - Exit the MENU
	DOWN	Under “menu interface” - Select the related menu Modify the values in the configuration state
	ENTER	Under “Menu interface” - Enter the sub-menu or confirm modification

Chapter 4 System menu & operating

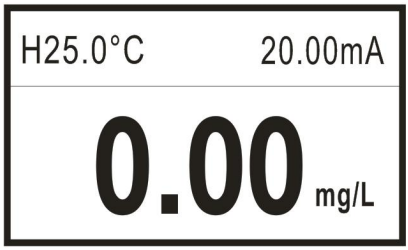
The instrument is equipped with monochrome lattice LCD, 128*64 resolution.

- The instrument is equipped with monochrome lattice LCD, 128*64 resolution.
- Push MENU to enter password verification interface; input password to enter the home interface.
- Push MENU to enter alarm inquiry interface, to inquire the current alarm configuration information.

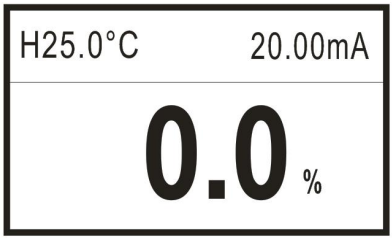
4.1. DO Monitoring interface

- **DM3000**

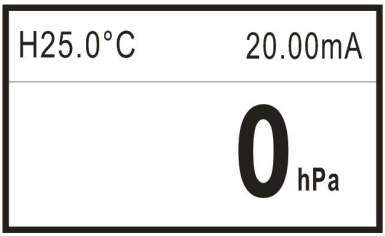
- **DM2800**



DO monitoring interface



Saturation monitoring interface



Oxygen partial pressure monitoring interface

Use MENU to enter the password verification interface, enter the password to enter the main menu interface.

Use the ENT key to enter the alarm query interface and query the current alarm setting information.

4.2. Password verification interface

---------- User Password ----------

Password: 0000

- Input password and push ENT to enter home interface.
- Initial password is 0000, which can be modified via password modification function. Please contact us if you forget your password.

4.3. Main menu

---------- Main Menu ----------

1. System Setting
2. Signal Setting
3. Online Calibration
4. Remote Setting
5. Alarm Setting
6. Version Query

- System Setting: settings of language, buzzer and backlight, modification of password and factory settings
- Signal Setting: switch of unit and temperature compensation, and settings of salinity and air pressure compensation.
- Online Calibration: correction of temperature, calibration of zero point and full scale of dissolve oxygen signal.
- Remote Setting: settings of RS485 parameters and current transmission output. Alarm Setting: settings of parameters of high and low alarm.
- Version Query: current version number

Chapter 5 Configuration

5.1. System Setting

---------- System Setting ----------

1. Language
2. Buzzer
3. Backlight setting
4. Change password
5. Factory setting

- Language: switch of language, Chinese and English.
- Buzzer: setting of switch of buzzer during alarm.
- Backlight Setting: setting of LCD backlight.
- Change Password: password modification and log-in with new password.
- Factory Setting: back to factory settings

5.2. Signal setting

- **DM3000**

---------- Signal Setting ----------

1. Temp Correction
2. Temp Compensation
3. Air Pressure Setting
4. Salt Content Setting
5. Temp Unit

- Temperature adjustment: available to adjust the measured temperature value, adjustment range: -5.0～5.0℃。
- Temperature compensation: available to choose manually temperature compensation or automatically temperature compensation.

- Pressure setting: setting pressure under current altitude, default atmosphere pressure 760mmHg。
- Salt Content Setting: set the salinity of the current solution. The default is 0.00ppt
- Temperature unit: available to choose which temperature unit to display, by default is ℃.

- **DM2800**

---------- Signal Setting ----------

1. Unit switch
2. Salt Content Setting
3. Air Pressure Setting
4. Temp Switch
5. Electrode Switch

- Unit switch: Switch among mg/L, % and hPa; mg/L for dissolved oxygen value; % for saturation value ; hPa for oxygen partial pressure.
- Salt Content Setting: Set the salinity of the current solution, range 0.00～99.99g/Kg。
- Air Pressure Setting: set the air pressure value of the current altitude. The setting range is 500 - 1100 hPa.
- Temp Switch: Set the automatic temperature compensation NTC 10K or PT1000 and manual temperature compensation value, and the measuring range is -10 - 60℃.
- Electrode Switch: It can switch between DS120 and DS130 coated dissolved oxygen sensors.

5.3. Online calibration

- **DM3000**

---------- Online calibration ----------

1. Air calibration

- Air calibration : calibration in air , then press 

button to calibrate.

- **DM2800**

---------- Online calibration ----------

1. Temp Modification
2. Zero Oxygen Calibration
3. Full Scale Calibration

- Temperature correction: Modify the temperature value of automatic temperature compensation, and the correction range is ±20.0℃.
- Zero oxygen calibration: zero oxygen calibration is performed in anhydrous sodium sulfite solution (configured with deionized water).(Unconditional non-zero oxygen calibration)
- Full calibration: calibration is carried out in air or saturated air and water. Before calibration, electric polarization on the electrode shall be ensured for more than half an hour. After the digital stability, press the 

button to calibrate.(The liquid in the membrane dissolved oxygen electrode will be constantly consumed, so please refilled the degree calibration once before each measurement, and the supplementary liquid will be replenished every other month.)

5.4. Remote transmission setting

---------- Remote setting ----------

1. RS485 setting
2. Current Transmission

- RS485 Setting: set 485 communication address （0~255）and baud rate （2400、4800、9600、19200）.
- Current Transmission: set 4mA corresponding value and 20mA corresponding value of 4-20mA output.

5.5. Alarm setting

- **DM3000**

---------- Alarm setting ----------

1. DO High Alarm
2. DO Low Alarm

- DO High Alarm: when the measured value is higher than high alarm pull-on value, high alarm relay pulls on; when the measured value is lower than high alarm cut-off value, high alarm relay cuts off.
- DO Low Alarm: when the measured value is lower than low alarm pull-on value, low alarm relay pulls on; when the measured value is higher than lower alarm cut-off value, low alarm relay cuts off.

- **DM2800**

---------- Alarm setting ----------

1. DO High Alarm
2. DO Low Alarm
3. SAT High Alarm
4. SAT Low Alarm
5. OPP High Alarm
6. OPP Low Alarm

- DO High Alarm: set the high reporting relay closing value and relay disconnecting value of dissolved oxygen content.
- DO Low Alarm: Set the closing value and disconnecting value of the low reporting relay of dissolved oxygen content.
- SAT High Alarm: Sets the saturation high report relay pull value and relay disconnect value.
- SAT Low Alarm: Sets the pull value and relay disconnect value of the underreporting relay of saturation.
- OPP High Alarm: set the suction value and relay disconnection value of the high reporting relay of oxygen partial pressure.
- OPP Low Alarm: set the suction value and relay disconnection value of oxygen partial pressure low alarm relay.

5.6. Version query

---------- Version Query ----------

Information inquiry: inquire the current hard software version, high traceability.

Chapter 6 Communication

The instrument is provided with standard RS485 series communication interface, in accordance with international universal standard MODBUS-RTU communication protocol, supporting No.03 register reading and holding command.
MODBUS standard format (read and hold command from Register 03)

Command format:

Definition	Address	Function code	Register address	Data number	CRC check
Data	ADDR	0x03	M	N	CRC 16
Bytes	1	1	2	2	2

Return format:

Definition	Address	Function code	Register address	Data number	CRC check
Data	ADDR	0x03	2*N	Data	CRC 16
Bytes	1	1	1	2*N	2

Register address description:

Address	Data type	Data size	Function code	Description	Access authority
0x0000	short	2 bytes	0x03	DO value (unit:mg/L, to be divided by 100)	Read only
0x0001	short	2 bytes	0x03	Temperature value (unit: ℃, to	Read only

				be divided by 10)	
0x0002	short	2 bytes	0x03	Saturation value (unit: %, to be divided by 10)	Read only

Example of DO reading:

Computer sends: 00 03 00 00 00 01 85 DB

DO meter returns: 00 03 02 00 00 85 84

Return command annotation:

00 is the address of slave device, which can be set in the instrument;

03 is the function code, reading and holding register;

02 is the length of data of returned DO value, 2 bytes;

00 00 is the returned DO value 0.00mg/L, to be divided by 100 to get the current DO value. Range: 0.00-40.00mg/L;

85 84 is the CRC16 check code, which changes along with the previous data;

Example of temperature reading:

Computer sends: 00 03 00 01 00 01 D4 1B

DO meter returns:00 03 02 00 FA 05 C7

Return command annotation:

00 is the address of slave device, which can be set in the instrument; 03 is the function code, reading and holding register;

02 is the length of data of returned temperature value, 2 bytes; 02 is the returned PH value 686 (hexadecimal high byte);

00 FA is the returned temperature value 25.0℃ (unit: ℃), to be divided by 10 to get the current DO value. Range: 0.0～60.0℃(DM3000)

-10.0~60.0℃(DM2800)

05 C7 is the CRC16 check code, which changes along with the previous data;

Chapter 7 Troubleshooting

User must read this manual carefully before installation and using the product, and follow the instructions to operate this product correctly, make sure the environment suits the requirement. The following table shows the potential problems, user could according to the problems to troubleshoot and solve the problems.

1. No display on controller?

A:Check if the power cable is correctly connected, power is on.

2. Number in display is jumping up and down?

A:Check if there is any interference equipment such as frequency converter is nearby. The instrument should be kept away from such interference equipment or protected with good shielding measures.

3. The response of number is slow?

A: If the electrode is covered by dirt, the response would be slow. Clean the pollutant in a corresponding method. A slow response is normal in winter.

4. Display of DM3000 incorrectly or shows ”--- --- ---”?

A:Wiring error: please check the input signal line connect correctly,please make sure that the electrodes connect correctly

Chapter 8 Warranty & After-sales Service

We promise to the customer that the hardware accessories provided during the supply of the instrument have no defects in material and manufacturing process.

From the date of the purchase, if the user's notice of such defects is received during the warranty period, the company will unconditionally maintain or replace the defective products without charge, and all non customized products are guaranteed to be returned and replaced within 7 days.

Disclaimers:

- During the warranty period, product faults caused by the following reasons are not in the scope of Three Guarantees service
- Product faults caused by improper use by customers.
- Product faults caused by disassembling, repairing and refitting the product.

After-sales service commitment:

- We promise to deal with the customer's technical questions within 2 hours.
- For the instruments returned to the factory for maintenance, we promise to issue the test results within 3 working days and the maintenance results within 7 working days after receiving them.