

## Optical dissolved oxygen controller

**Supmea**

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Supmea Automation Co.,Ltd.

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## **Preface**

Thank you for purchasing the optical 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-DY2000/DY2016/DY2900/DY3000-EN2

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## 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.

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- 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

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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.

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## 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	Optical 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.

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## **Chapter 1 Production Introduction**

Optical Dissolved Oxygen Online Analyzer, an intelligent online chemical analyzer, 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**

- 2.8 inches 128\*64 lattice screen.
- Isolating transmitting output, with little interference.
- Isolating RS485 communication.
- DO/SAT measurement, temperature measurement,
- upper/lower limit control, transmitting output, RS485 communication.
- Configurable upper/lower limit alarm and delay.
- Configurable hummer and LCD backlight switch.
- Optional language, Chinese and English.
- Air calibration.
- Automatic temperature compensation.

**1.2. Parameter**

Model	DY2016 / DY2000	DY2900/ DY3000
Display	2.8-inch monochrome LCD screen, resolution 128*64	
Dimension	Overall dimension: 100mm * 100mm * 150mm (DY2019 / DY2900) 100mm * 100mm * 150.5mm (DY2000 /DY3000 ) Cutout dimension: 92.5mm*92.5mm	
Mounting panel thickness	1.5mm~13mm	
Weight	0.65kg	
Measured variable	DO and saturation	
Measuring range	DO :(0~20)mg/L Saturation:(0~200)%	
Accuracy	±0.5%mg/L	±3%FS
Temperature accuracy	±0.5℃	
Signal output	Isolated, 4 - 20mA current transmission output, Max. loop resistance: 500Ω, output accuracy 0.2%FS	
Relative humidity	10%~85% (No condensation)	
Communication	Isolated, RS485 Modbus-RTU	
Power supply	AC220V±10%, 5W Max, 50Hz	
Relay out	Break away/pick up 2 channel, AC250V/3A	
Working temperature	(0~60)℃	
Storage	Temperature: (-15~65)℃ Humidity: (5%~85%)RH (No condensation) Altitude: <2000m	

## Chapter 2 Installation

### 2.1. Installation of instrument

Please read the instruction of installation location and method of instrument as described during installation.

#### Installation precautions

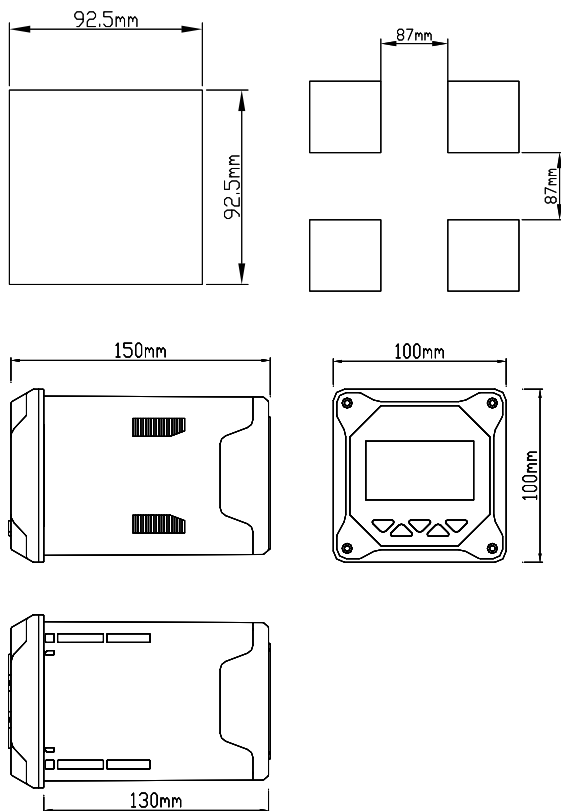
- It shall be installed inside the building so as to avoid wind and rain as well as direct sunlight.
- Please install it at the place with good ventilation in order to prevent the internal temperature of the instrument from rising.
- Don't lean to left or right when the instrument is installed, horizontal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

#### Installation should be kept away from the following site

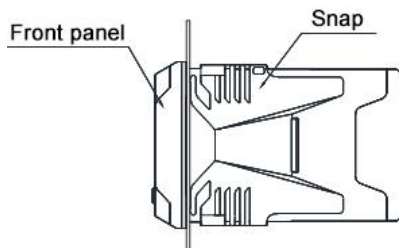
- The place where the environment temperature exceeds 60°C during the work.
  - The place where the environment humidity exceeds 85% during the work.
  - The vicinity of the electromagnetic occurring sources.
  - The sites with strong mechanical vibration.
  - The site where the temperature is changed a lot and the moisture condensation is easily formed.
  - Places with lots of lampblack, steam, moisture, dust and corrosive gas.
- 2.1.3  
Installation methods

## 2.2. Installation (DY2900 / DY2016)

Open a 92.5 \* 92.5(mm) installation hole on the instrument cabinet or installation panel (the dimension is 100\*100\*150mm).

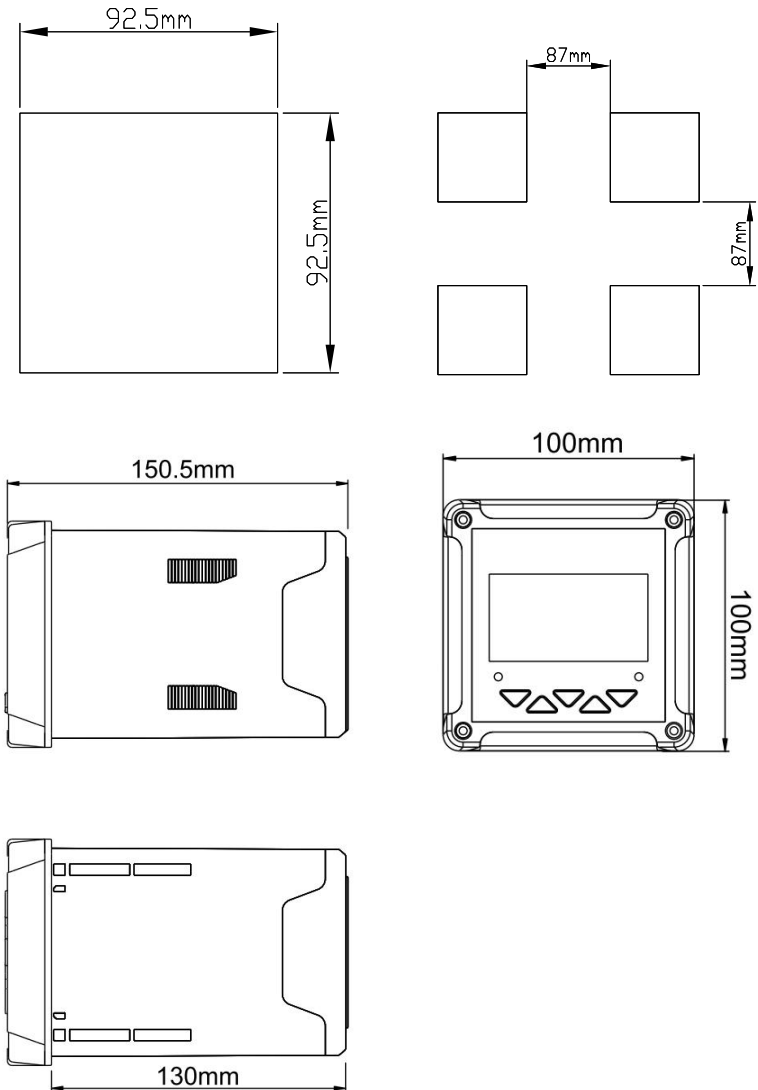


The instrument into the mounting hole and then buckle on the snap, as shown below

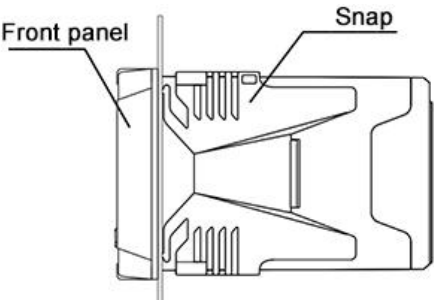


### 2.3. Installation (DY2000 / DY3000)

Install a 92.5 \* 92.5 mounting hole on the instrument cabinet or mounting panel, The thickness of the installation panel is 1.5mm~13mm.

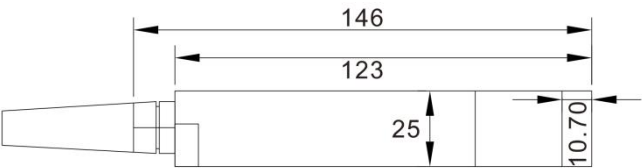


The instrument into the mounting hole and then buckle on the Snap, as shown below

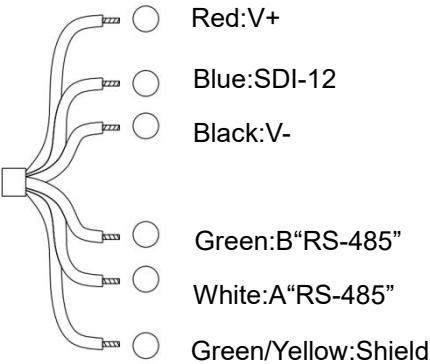


**2.4. Sensor for DY2016 / DY2000**

● **Sensor Dimension**



● **Sensor Wiring**

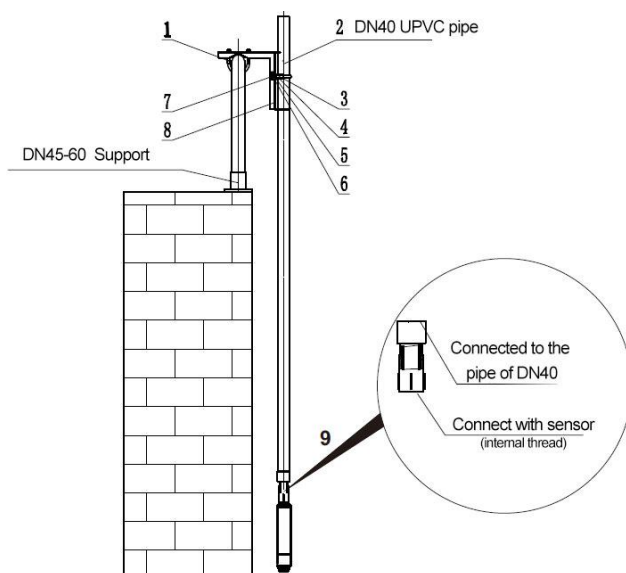


## 2.5. Electrode installation (DY2016 / DY2000)

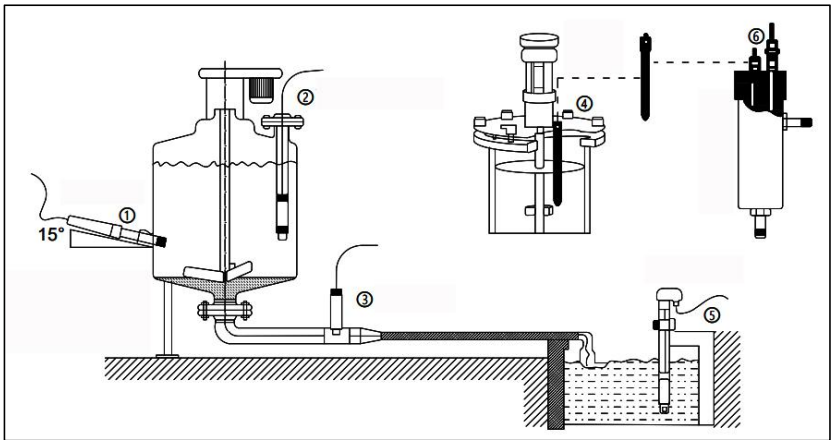
The installation steps for the sensor as follow:

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	



2.6. Electrode installation(DY2900/ DY3000)

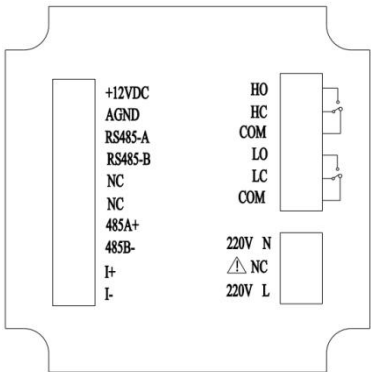


Schematic diagram of common installation method

- ①Side wall installation    ②Flange mounted at the top    ③Pipe installation    ④Top installation    ⑤Submersible installation    ⑥Flow-through installation

The interface must be in 15°oblique angle, or it will affect the normal test and use of the electrode. We won't be responsible for any results due to this.

2.7. Wiring of instrument



Wiring diagram

**Identification of terminal**

- +12VDC: Power supply of dissolved oxygen electrode
- AGND: Power negative of dissolved oxygen electrode
- RS485-A: Dissolved oxygen electrode communication-A
- RS485-B: Dissolved oxygen electrode communication-B
- NC: Null
- NC: Null
- RS485(A+): RS485 communication interface A+
- RS485(B-): RS485 communication interface B-
- I(+): 4-20mA output +
- I(-): 4-20mA output -
- HO: High alarm of normal open relay
- HC: High alarm of normal close relay
- COM: Common terminal
- LO: Low alarm of normal open relay
- LC: Low alarm of normal close relay
- COM: Common terminal
- 220V N: AC220V neutral wire
- NC: Null
- 220V L: AC220V 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








★ DY2900 / DY2016



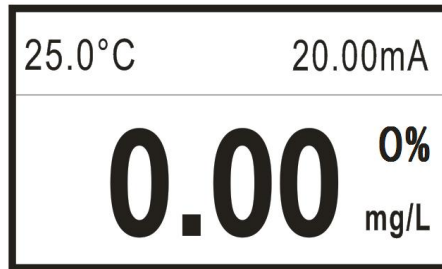
★ DY2000 / DY3000

#### 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 Operation

### 4.1. Monitoring interface



Main monitoring interface

- 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 [EXIT] to enter alarm inquiry interface, to inquire the current alarm configuration information.

### 4.2. Password verification interface

----- User Password -----  
Password: 0000

- Input password and push [ENTER] 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: settings of signal correction, slope, air pressure compensation, salinity and response time.
- Online Calibration: electric pole's air calibration.
- 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 configuration

----- 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 configuration

❖ **DY2016**

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

1. Electrode factory
2. Air Pressure Setting
3. Salt Content Setting

- Electrode factory: The electrode restores the factory calibration coefficient, and the air pressure compensation restores to the default value of 1013hPa. The salinity returns to the default value of 0.00ppt.
- Air Pressure Setting: set the air pressure value of the current altitude. The default value is the standard atmospheric pressure, 1013hPa.
- Salt Content Setting: set the salinity of the current solution. The default is 0.00ppt.

### ❖ **DY2900**

#### ----- Signal Setting -----

1. DO Correction
  2. Slope Setting
  3. Air Pressure Setting
  4. Salt Content Setting
  5. Response Time
- DO Correction: the measured value of dissolved oxygen can be corrected within the range of -9.99 ~9.99 mg/L.
  - Slope Setting: manually set the linearity of the electrode signal. Please do not modify it by yourself. It can only be modified under the guidance of technical personnel.
  - Air Pressure Setting: set the air pressure at the current altitude. Default is one standard atmosphere pressure 760 MMHG.
  - Salt Content Setting: set the salinity value of the current measurement solution. The default value is 0.00g/Kg.
  - Response Time: set the response time of the electrode, and the default is 60s.

### **5.3. Online calibration**

#### ----- Online calibration -----

1. Air calibration
- Air Correction: In case of air and Saturated oxygen solution to calibrate, push [ENTER] to calibrate.

### **5.4. Remote Transmission Configuration**

#### ----- Remote setting -----

1. RS485 setting

## 2. Current Transmission

- RS485 Setting: set RS485 communication address and baud rate.
- Current Transmission: set 4mA corresponding value and 20mA corresponding value of 4-20mA output.

### 5.5. Alarm configuration

#### ----- 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.

### 5.6. Version inquiry

#### ----- Version Query -----

- Version Query: inquire the current hard software version, which is high traceable.

## 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

#### Descriptions of register address:

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

02 is the returned PH value 686 (hexadecimal high byte);

00 00 is the returned DO value 0.00mg/L, to be divided by 100 to get the current DO value. Range: 0.00-20.00mg/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℃;

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

## Chapter 7 Troubleshooting

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. The LCD screen has no display?

A: Please make sure the power connection is correct and the power supply is normal.

## 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.