Foreward

Thank you for using the pHD/ORPD-6000 industry series pHD/ORPD Data acquisition terminal

Please read this manual carefully before installation. The correct installation and parameter settings will maximize the performance and advantages of the product and bring you a good experience.

The water quality online analyzer is a precise electrochemical analysis &Control Integration System, which should be operated by technicians with relevant professional knowledge.

If you encounter difficulties in the process of installation or use

After you unpack the box, please be sure to check the complete list and the actual product you received. If there is any missing or damaged product

Manufacturers solemnly promise:

1. Regardless of where you get this product, the manufacturer promises a lifetime technical service to the product it sells.

2. Damage to the following causes is not covered by the warranty

A、Misconnection of high voltage power supply or flooding

B、Damage caused by unauthorized modification and misuse

C、Incidental loss due to improper selection

D、Damage caused by exceeding the product's prescribed conditions of use

E、All physical damage caused by improper force

F、Failed to be stored or transported according to the prescribed storage or transportation conditions (reference standard SJ/T10463-93)

G、Consumable materials need to be purchased separately

 When this symbol appears in the manual, it indicates that special attention must be paid to safety, installation, product functions and use!

Advancing with the times is the natural law of enterprise development. the product will be improved and updated at any time. Without notice for matters that do not involve the installation. Please make the object as the standard.

PHD-6110 /ORPD-6110

1.General information

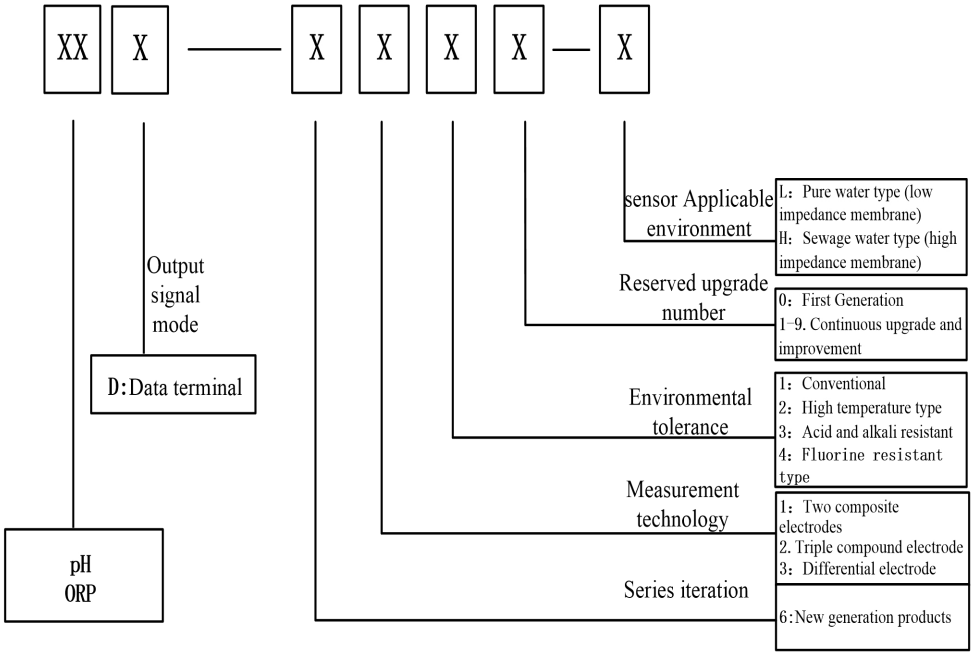
pHD/ORPD-6000 is not a traditional pH sensor, but a pHD/ORPD data acquisition terminal, which directly uses RS485 physical port to transmit data without distortion to industrial computer, PLC, touch screen and other platforms, compatible with the Internet+ and Networking with the application of traditional technology. And once wiring is used permanently.

The usual pH/ORP data acquisition mostly uses the weak electrostatic signal from the pH sensor to be connected to the meter via a cable. In the face of an electronic signal with an impedance of up to $10^{7-12}\Omega$, only a few hundred/ten mV, the cable and the connection medium are used in The limit is critical, the cable length is limited, and no secondary wiring is allowed in the middle.Otherwise, the impedance signal is very easy to be leaked and interfered, and the sensor must be replaced together with the cable every time the sensor is replaced.

This product has a series of patented technologies such as subversive opening split, wireless transparent transmission, no on-site APP calibration, no difference correspondence, quality improvement, product performance tracking, no secondary wiring, and cable distance of up to kilometers. The confusion of conventional industrial online pH/ORP sensors.

This pH/ORP data acquisition terminal is an IoT collection terminal, directly integrated into PLC, DCS and other systems. It can use more IoT modules to realize wired, wireless, and cloud transmission of wired, wireless, network, and optical transceivers. It is itself An IoT ecological instrument.

2.Product naming



3. Performance characteristics

- No on-site APP calibration of the electrochemical head (complete batch calibration in the laboratory);
- On-site matching without difference replacement corresponding (automatic default);
- No need for secondary wiring, once the communication cable is wired for permanent use;
- Wide power supply range, ignoring the influence of circuit loop resistance voltage drop;
- Micro-encapsulation transparent transmission technology, embed electric meter and communication into the sensor connector;
- RS485 physical port, Modbus RTU protocol basic data link;
- The IoT ecosystem can convert data into any protocol and communication mode;
- Support wired/wireless/network/optical path/cloud data transmission module to realize information transmission;
- Directly interconnect with industrial computer, configuration system, industrial DCS system, PLC and other equipment;

- Compatible with traditional 4-20mA system (RS485/4-20mA+WiFi module, the corresponding information of digital quantity and mA can be set accurately by APP);
- Split detachable structure, only need to replace the chemical collection unit for each update;
- Wireless transparent transmission technology, no metal exposed, no corrosion and aging, no water vapor leakage impact;
- APP calibration, non-discriminatory replacement, easy to use, easy to replace, no need for professional knowledge;
- The product has multiple traceability such as physical examination, traceability, resume, life span, obstacles, etc.

4. Supporting applications

- ✧ Directly used as the data acquisition terminal of the industrial field DCS and PLC system;
- ✧ Directly Access to cloud communication and big data platform through DTU of GPRS system;
- ✧ Directly use the WiFi module as a nearby wireless data collection terminal;
- ✧ The remote wireless collection terminal can be achieved through the ZigBee/Lora module;
- ✧ Optical remote data collection can be realized through optical transceiver and far infrared terminal;
- ✧ Support traditional 4-20mA industrial system (cable end RS485/4-20mA) module conversion;
- ✧ It is equipped with RS485/WiFi/USB multiple tool converters to realize APP calibration, address and baud rate search and configuration of the collection terminal;
- ✧ With the aid of the calibration PC/APP device (pHC/ORPC-6110), it can realize batch calibration in the laboratory, and replace the new humanized maintenance mode without difference on site;

✧ No special low-noise cable is needed for free extension in the middle, and the maximum direct distance is close to one kilometer without affecting the use.

Figure 4.1 Multiple display modes of data acquisition terminal

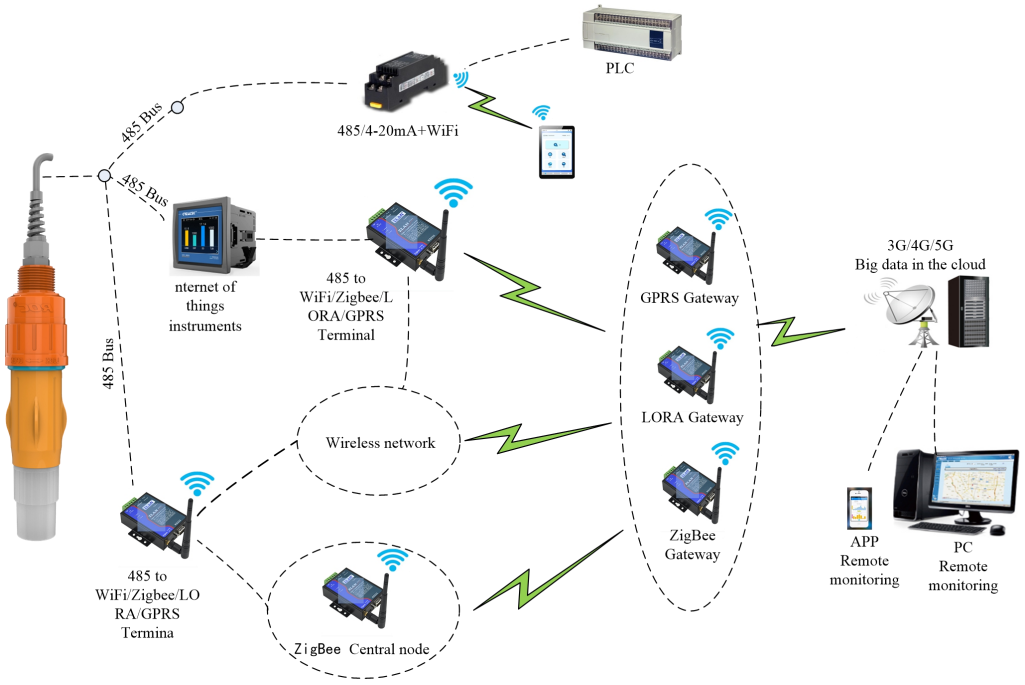


Figure 4.2 Schematic diagram of data acquisition terminal connection

5.Main technical indicators

Product model	pHD/ORPD-6XXX series		
Product name	pHD/ORPD data acquisition terminal		
Measure item	pH	ORP	Enclosed temperature
Measure range	2.00-12.00	(-1999-+1999) mV	(0-50) ℃
Resolution	0.01	1mV	0.1℃
Accuracy	±0.1	±5mV	±0.5℃
Working environment	Temperature: (-20-60) ℃; Humidity: ≤90%RH (Non-condensing)		
Withstand stress	0.4MPa		
Cable length	Standard at 10m, Can support up to 200m (by appointment)		
Protocol	RS485 communication (standard Modbus-RTU protocol)		

Power supply	DC 9-28）V
Whole machine consumption	1.2W
Weight	0.6kg
Main material	ABS
Dimensions	φ45mm*220mm
Pipeline installation	NPT 3/4" chemical front end
Environmental protection bracket	Thread:NPT3/4"

6.Product form and wiring instructions

(1) Product dimensions and ecology

1. Overall size

The complete pH/ORP data acquisition terminal is a whole without electrical components connected by the chemical acquisition part and the data transmission part.

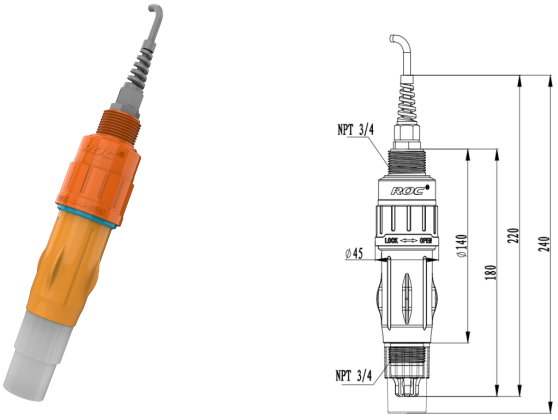
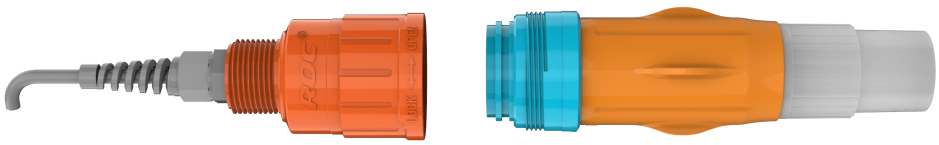


Figure 6.1 Product effect and dimensions

2. Split parts

The chemical acquisition part is a part of consumable materials that can be calibrated and replaced at any time, and the data transmission part is a permanent

electronic system part. Once the power distribution is installed, only the chemical acquisition part needs to be replaced. The data transmission part and cables do not need to be replaced, and there is no need to repeat wiring



Permanent data transmission part　　Chemical collection part can be replaced at any time

Figure 6.2 Schematic diagram of split parts

(2) Circulation device and size

The overflow type circulation collection/inflow type circulation collection device satisfies a wide range of industrial process applications, threaded, seated, and PVC bonded installation forms, and the on-site construction is simple and convenient.

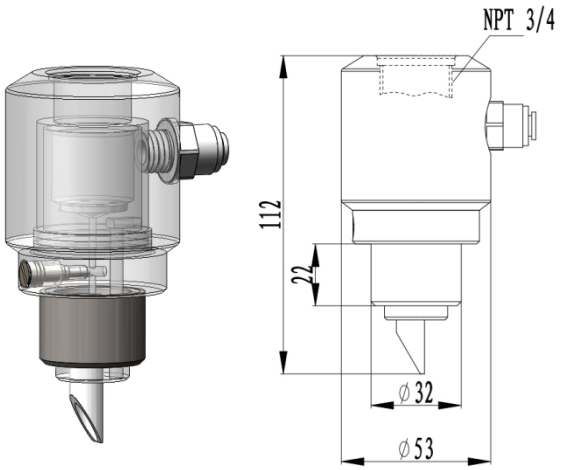


Figure 6.3 Circulation device effect and dimensions

(3) Wiring instructions

1. Cable

In order to obtain longer-distance transmission and environmental tolerance, the cable used in this data acquisition terminal has a slightly larger cross-sectional area of the power cord, while the communication line uses twisted-pair composite cables to improve the communication transmission effect. It is not recommended that

customers replace others at will Commercially available cables with specifications to avoid affecting transmission characteristics, it is recommended to reserve a relatively rich length or original cables when purchasing products.

2. Transmission distance

Data collection terminals of different attributes have different maximum limits, and different power supply voltages support different lengths. Please calculate the maximum power distribution distance according to the following table.

Input voltage	Loop current	Maximum loop resistance	Maximum cable length
24V	55mA	270Ω	1350m
12V	120mA	25Ω	125m

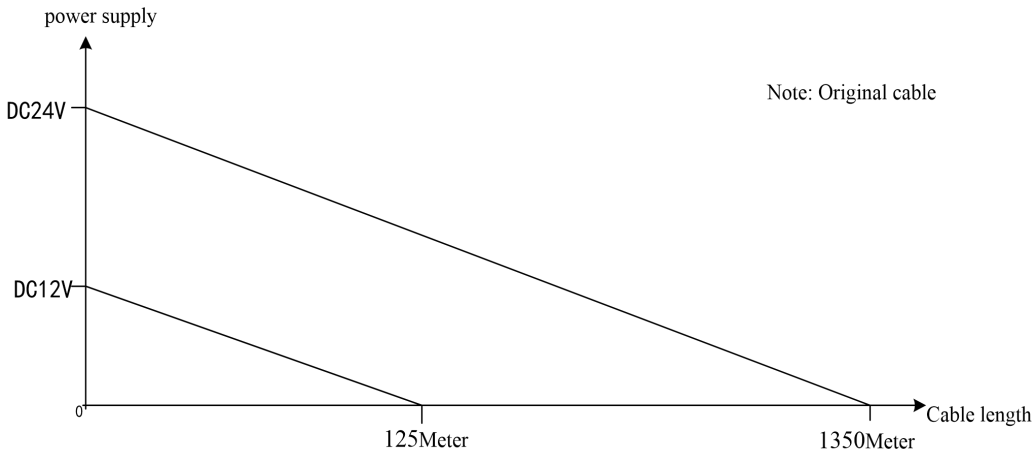


Figure 6.4 Relationship between power supply and cable length

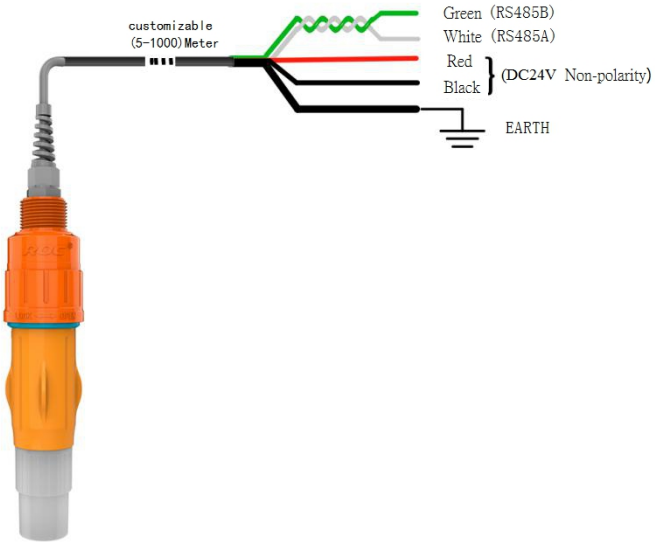


Figure 6.5 Wiring description diagram

(4) Communication settings

1. Communication address and speed:The front-end data head directly sends RS485 communication data to the receiving end,The default baud rate when the product leaves the factory: 9600;Address bit: 01

2. For batch setting, the factory provides product calibration and setting of the handheld programmer, which can be set through the APP;

If you need to change the address and rate before, you can find the current address and redefine the new address and rate on the APP.

3. To use the handheld terminal, connect the four wires at the end of the cable to the handheld terminal, scan the QR code on the handheld terminal, download the applet from the cloud, and open the handheld terminal to complete address modification or product calibration, etc. jobs.

4. Offline setting and operation.

Figure 6.6 Schematic diagram of offline setting operation

7. Installation and maintenance guidanc

(1) Installation method

Figure 7.1 Pipe installation

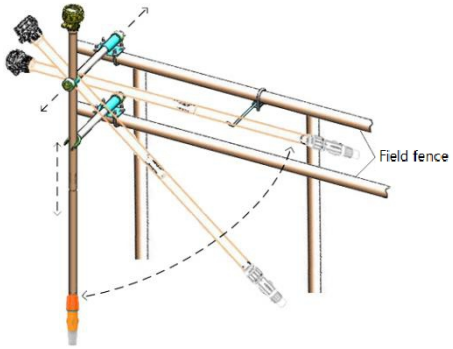


Figure 7.2 Environmental protection bracket installation

Figure 7.3 Anti-swing installation in the tank

1. Pipeline drainage installation

- ✧ Innovative measuring circulation device, the company's unique patented product:
- ✧ Between the pipeline and the data measurement terminal, compatible with a variety of pipe diameters;
- ✧ With water sample flow adjustment function, the water sample flow is stable;
- ✧ Only the smallest fluid volume is required, and the electrode life is greatly extended;
- ✧ Facing different application scenarios, there are multiple solutions to

problems;

- ✧ For pure medium unidirectional flow, prevent the electrolyte in the sensor from polluting the measured medium;
- ✧ Application scenarios where the medium is allowed to return, circulation in the pipeline.

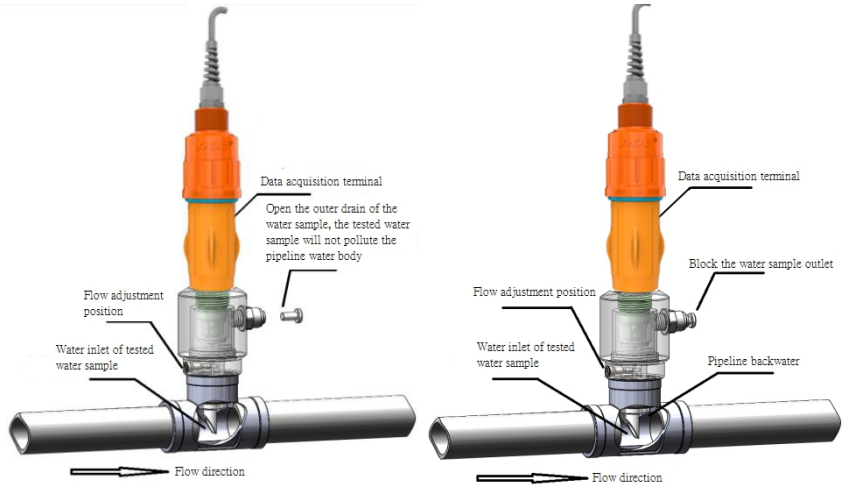


Figure 7.4 Use effect diagram of water sample drainage method

[Note 1]:

1. This device is designed for clean water samples in industrial processes,When there are trace impurities in the water sample, please install a filter in the front pipeline;

2. When the pipeline cannot be full, it is recommended to add an upward bend at the rear;

3. pH/ORP measurement shall not be installed horizontally or backwards;

Figure 7.5 Installation prohibition diagram

[Note 2]: In case of the following problems,Recommend to choose our company P36 measuring circulation device:

- ✧ When directly installed in the pipeline, the flow must be cut off to complete the disassembly and assembly of the collection terminal;
- ✧ The turbulence and bubbles in the pipeline will cause the measured value of the collection terminal to be unstable;
- ✧ Excessive pipeline pressure or water hammer effect directly threatens the working characteristics of the collection terminal;
- ✧ In the measurement of pure water or high-purity water, the displayed value is unstable or has large errors;
- ✧ The sensor of the chemical unit for measuring pure water quality has fast failure speed and short life span;
- ✧ The pure medium does not allow other electrolytes to diffuse and pollute the tested water;
- ✧ The water hammer effect and negative pressure in the pipeline will cause permanent damage to the sensor;
- ✧ Particles in water collide with sensitive membranes and fiber entanglement, which can easily cause permanent scrap.

2.Environmental protection bracket installation

It is generally applicable to the support and installation of collection terminals in environmentally friendly sewage treatment plants and other pools or open channels and aquaculture ponds. It is convenient for on-site maintenance and is an innovative installation method that is safe, convenient, compatible, sanitary and civilized.

When there are many impurities in the water body, and it is easy to entangle or accumulate around the sensor, you can also purchase our company's automatic maintenance device to automatically eliminate these effects at regular intervals.

Figure 7.6 The effect diagram of bracket installation of rotating environmental protection sensor

3. Tank-type installation

It is used in reaction kettles of chemical manufacturing and biopharmaceutical processes to install and protect data collection terminals, especially in tanks with agitating devices that contain more particles or material swings.

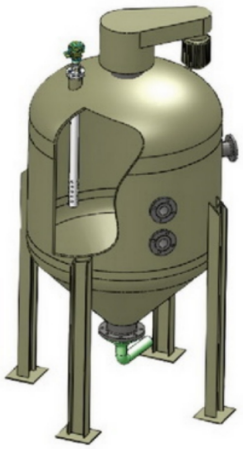


Figure 7.7 Tank installation effect diagram

4. Wireless remote connection

In construction sites that are blocked by rivers, ponds, and buildings, when bridges, pipes, and wiring cannot be erected, you can purchase our company’s LORA or Zigbee or WIFI wireless modules to achieve remote wireless transmission. This is in environmental monitoring, Sewage treatment plants,

aquaculture farms, and subsequent expansion of factories are favored by user engineers because of the convenience of networking.

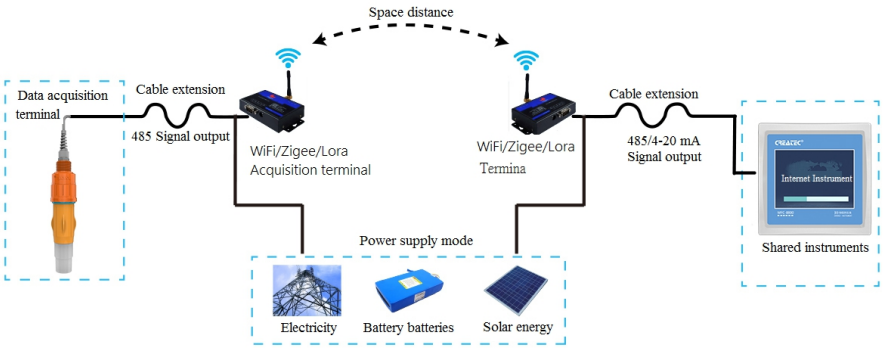


Figure 7.8 Schematic diagram of wireless remote connection

Note:

WiFi——Only short-distance communication under barrier-free barriers;

LORA——It can communicate at long distances (about 10Km) without barriers;

Zigbee——It can be composed of multiple relay relays when encountering obstacles to avoid obstacles.

5. Data bus application

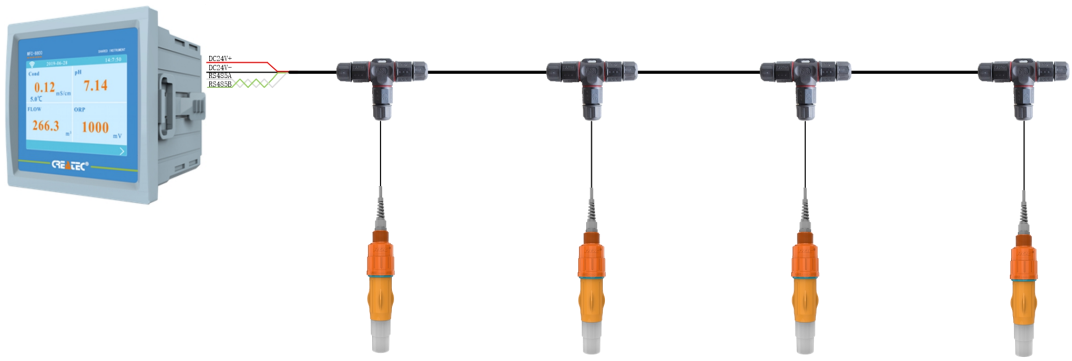


Figure 7.9 Field data bus serial application

In the industrial field, the original factory cables are used for serial power distribution, which will reduce the construction and cost of cables.

(2) Replacement of chemical collection part

The data collection terminal adopts a split and detachable structure,Divided into two parts: data transmission unit (upper end) and chemical acquisition unit (lower end),The chemical collection part can be calibrated in batches without on-site

(laboratory), and the on-site non-discriminatory correspondence defaults. Even for non-professionals, the on-site replacement of the chemical collection must be completed;

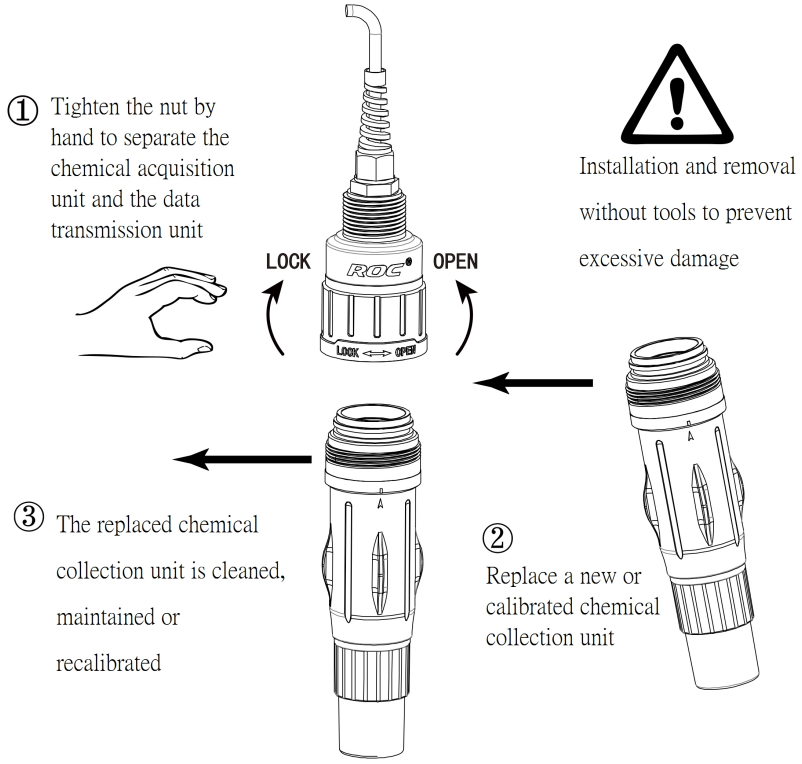


Figure 7.8 Data collection terminal maintenance effect diagram

Replacement steps:

1. There is no need to disconnect the power supply, and the chemical collection part of the data collection terminal can be directly separated from the data transmission part;

2. Disassemble, remove the chemical collection part along the direction of rotation indicated by the OPEN arrow on the upper part of the data collection terminal;

3. Install, tighten the upper part along the direction indicated by the LOCK arrow;

4. If the data transmission part is fixed and difficult to operate, the chemical collection part can be screwed in the opposite direction to disassemble and replace.

⚠ No tools are required for installation and disassembly to prevent excessive damage

(3)Data acquisition terminal calibration

1. Transparent transmission type offline calibration:

Wireless transmission between the upper and lower units of the data collection terminal, the chemical collection part has its own memory storage function, is equipped with a corresponding calibration device (pHC/ORPC-6110), laboratory calibration (buffer does not leave the laboratory) , The operator does not need to operate in the dangerous scene.

Figure 7.9, Schematic diagram of collection terminal wireless transparent transmission

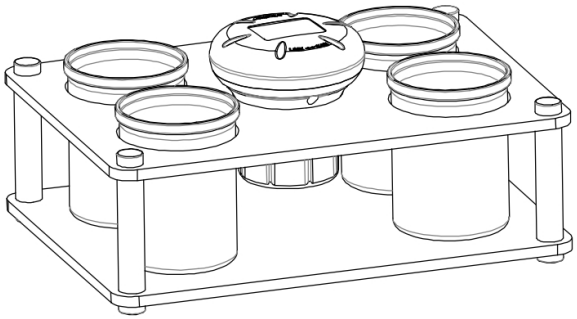


Figure 7.10, Schematic diagram of calibration device

Figure 7.11 Batch calibration in laboratory environment

2. Complete set of calibration device:

Group customers calibrate handheld programmer, reagent cup, bracket set

The calibrated handheld communicator is equipped with a built-in lithium battery and power management system. It is equipped with a USB port and WiFi function connected to a PC and a mobile PC. The operator scans the QR code on the handheld communicator and directly downloads the APP application from the cloud. Under the guidance of its language menu, pH calibration and physical examination can be easily completed, turning the previously boring professional operation into a fun and relaxing experience.

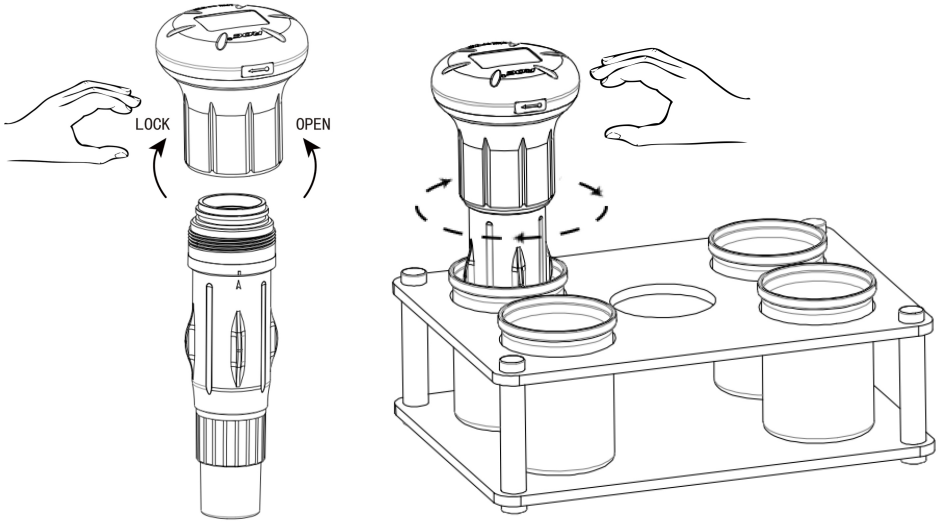


Figure 7.12 Data Collection Terminal-Calibration Diagram

3. Calibration steps:

1. Download the APP and register, and perform calibration according to the page prompts;

2. Configure 2/3 kinds of buffers and cleaning solutions according to on-site use;

3. Unscrew the pH sensor chemical collection unit from the installation position;

4. Rotate the chemical acquisition unit with the calibration handheld programmer and turn on the power switch;

5. Use WiFi or data cable to connect the chemical acquisition unit through APP, and perform the calibration operation of the corresponding buffer according to the APP instructions after the communication is normal.

6. After calibrating the corresponding buffer, connect the chemical acquisition unit to the data transmission unit for normal use

4. Commercialized foolproof buffer

Figure 7.13 pH standard solution

5. APP calibration operation interface

Figure 7.14 Schematic diagram of APP interface

8. Daily maintenance and precautions of the sensor

(1) Maintenance

1) The sensitive glass membrane part of the chemical unit should not be stored

dry for a long time, and should be soaked in a protective cover with 3.0mol/L potassium chloride solution;

2) It is recommended to clean the sensor end regularly according to the medium condition, and regularly calibrate the meter;

3) If collecting terminal adhesion suspended matter, rinse it with 0.01mol/L HCl or NaOH solution, and then rinse it with clean water;

4) If the electrode slope cannot be recovered after maintenance and maintenance, a new chemical unit needs to be replaced;

5) When the surface of the platinum ring of ORP collection terminal is contaminated by impurities, it can be cleaned with 0.01mol/L HCl or NaOH solution, and then washed with distilled water;

6) The platinum surface passivation caused by strong oxidation or strong reduction will affect the potential response of the collection terminal. You can use toothpaste grinding or polishing sandpaper to cut the platinum surface, and then wash it with distilled water;

7) The clean collection terminal is recommended to be immersed in a 3.0mol/L potassium chloride solution and hydrated for 6 hours before use;

8) The pH value of the pH buffer at different temperatures is different. It is recommended to calibrate at 25℃ or calibrate with automatic temperature compensation turned on;

9) Some special media will cause early failure or permanent damage to the collection terminal. It is recommended to consult the technical department of our company when using this media or special process for the first time.

(2) Precautions

1) The chemical collection unit in the pHD/ORPD data collection terminal is a consumable part, which will be invalid for long-term storage, so long-term storage is not recommended;

2) After the replaced chemical collection unit is tested to be normal, it needs to be maintained for the next use;

3) Do not remove the moisturizing protective cap when the chemical collection unit is not in use;

4) Organic solvents such as carbon tetrachloride, trichloroethylene, tetrahydrofuran, etc. will damage the ABS collection terminal shell. For special media, it is necessary to declare that the company provides shells of other materials;

5) It is not recommended to measure media containing sulfide ions, ammonium ions and hydrofluoric acid;

6) It is not recommended to store in cold, high humidity, flammable, explosive and strong electromagnetic environment;

7) Since the pH sensor is a special product, there are many contraindications and skills in its application. When it is used in a special process or a special solution, please declare in advance before purchasing. The manufacturer shall verify and recommend the problem for its test. We will not accept compensation or complaints for solutions, concealing the facts and unhappiness caused by self-testing.

9.Product completeness

(1) Standard package

Order number	Name	Specification model	Unit	Picture
248765	industry pH/ORP data acquisition terminal	pHD/ORPD-6000	set	
109017838	Instruction	pHD/ORPD-6000	pc	

1080465	Certification	pHD/ORPD-6000	pc	

(2)Consumables

Order number	Name	Specification model	Unit	Picture
248767	Industrial pH data acquisition terminal-chemical unit	pHD-6110-HS	pc	
	Industrial ORP data acquisition terminal-chemical unit	ORPD-6110-HS	pc	

(3)Communication conversion accessories (optional)

Order number	Name	Specification model	Unit	Picture
	RS485/WiFi converter	CCM-8110	set	
	RS485/ Bluetooth converter	CCM-8120	set	

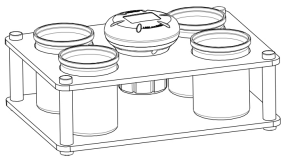
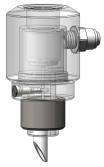
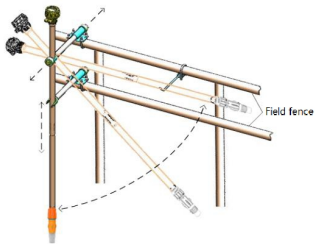
248763	RS485/4-20mA+WiFi converter	CCM-8131	set	
248764	RS485/4-20mA+USB converter	CCM-8132	set	
	RS485/RS232 converter	CCM-8140	set	
	RS485/CAN converter	CCM-8150	set	
	RS485/Lora converter	CCM-8160	set	
	RS485/ZigBee converter	CCM-8170	set	
	RS485/Optical transceiver converter	CCM-8180	set	
	RS485/ Ethernet converter	CCM-8190	set	
	RS485/HART converter	CCM-81A0	set	
	RS485/ Infrared communication converter	CCM-81B0	set	
	modbus/profibus converter	CCM-81C0	set	

	Portable End-of-hand Communicator	RS485·WIFI	set	

(4)Display unit (optional)

Order number	Name	Specification model	Unit	Picture
510054	Universal multi-function controller (Wall-mounted)	MCC-2321	set	
242010	Universal multi-channel controller (Panel type)	MFC-1380 （138*138）	set	
242010	Universal multi-channel controller (Sealed)	MFC-1200	set	
248769	IoT instrument	MFC-8800 （96*96）	set	

(5)Product calibration accessories (optional)

Order number	Name	Specification model	Unit	Picture
	Calibration device	pHC/ORPC-6110	set	
2511263	Circulation device	P36	set	
	Environmental sensor bracket			
	Tank sensor mounting bracket			
	Air source automatic cleaning			
	Automatic cleaning of hydraulic power source			

(6)Standard solution (optional)

Order number	Name	Specification model	Unit	Picture
	Standard solution	pH=4.01	500mL/bottle	
	Standard solution	pH=6.86	500mL/bottle	
	Standard solution	pH=9.18	500mL/bottle	

(7)Connector (optional)

Order number	Name	Specification model	Unit	Picture
112031814	Bus waterproof splitter	M20T-Tee-4 core	pc	

附录 1 通讯协议

从公司官方网站注册下载 RS485 Modbus RTU 通讯协议和上位机标定&设置软件

使用 APP 操作和设置校准时，扫描二维码下载安装小程序

网址：http://www.createc.cn

制造商信息： 河北科瑞达仪器科技股份有限公司

售前/售后 TEL：400-666-1916