**Portable Meter**

**User Manual**

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Please read operating manual before installation and operation.

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* PH10 Portable pH/mV Meter
* ORP10 Portable ORP Meter
* EC10 Portable Cond/Res./TDS/Sal Meter
* DO10 Portable DO Meter (polarographic type)
* PC10 Portable pH/Cond Meter
* PD10 Portable pH/DO Meter (polarographic type)
* CD10 Portable Cond/DO Meter (polarographic type)
* PO10 Portable pH/ORP Meter
* PCD10 Portable pH/Cond/DO Meter (polarographic type)



INDEX

[1. Overview 3](#_Toc172482366)

[1.1 Package content 3](#_Toc172482367)

[1.2 Key features 4](#_Toc172482368)

[2. Technical specifications 5](#_Toc172482369)

[3. Descriptions 6](#_Toc172482370)

[3.1 Measurement screen 6](#_Toc172482371)

[3.2 Meter socket 6](#_Toc172482372)

[3.3 Operation keys 6](#_Toc172482373)

[3.4 Display icons 7](#_Toc172482374)

[3.5 General parameter setting 7](#_Toc172482375)

[4. Instrument checking 7](#_Toc172482376)

[5. pH module 8](#_Toc172482377)

[5.1 pH parameter setting 8](#_Toc172482378)

[5.2 pH calibration and measurement 8](#_Toc172482379)

[5.3 pH measurement notes 9](#_Toc172482380)

[6. ORP module 11](#_Toc172482381)

[6.1 ORP measurement 11](#_Toc172482382)

[6.2 ORP measurement notes 11](#_Toc172482383)

[7. COND module 12](#_Toc172482384)

[7.1 Cond parameter setting 12](#_Toc172482385)

[7.2 Cond submenu setting 12](#_Toc172482386)

[7.3 Conductivity calibration and measurement 13](#_Toc172482387)

[7.3 Notes about the conductivity 13](#_Toc172482388)

[8. DO Module 15](#_Toc172482389)

[8.1 DO menu setting 15](#_Toc172482390)

[8.2 DO calibration and measurement 16](#_Toc172482391)

[8.3 Notes about the DO test 17](#_Toc172482392)

[8.4 DO sensor cap replacement 17](#_Toc172482393)

[9. Data storage 18](#_Toc172482394)

[10. PC communication 18](#_Toc172482395)

[11. Warranty 20](#_Toc172482396)

[12. Appendix A： Content of saturated oxygen in water at different temperatures 21](#_Toc172482397)

[13. Appendix B：Content of saturated oxygen at different air pressure 22](#_Toc172482398)

[14. Appendix C: Content of saturated oxygen at different altitude 23](#_Toc172482399)

[15. Appendix D: Troubleshooting 24](#_Toc172482400)

**Notes**

**Some organic solution would dissolve the plastic electrode, should avoid test such sample solutions.**

# Overview

Thank you for purchasing microprocessor-based portable pH/Cond/DO meters.

Be sure to read this manual before using the product to ensure proper and safe operation of the product. Also, safely store the manual so it is readily available whenever necessary. Product specifications and appearance as well as the contents of this manual are subject to change without notice.

## 1.1 Package content

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Portable Series** | | | **single parameter** | | | | **multi-parameter** | | | | |
| **Model No.** | | | **PH10** | **ORP10** | **EC10** | **DO10** | **PC10** | **PD10** | **CD10** | **PO10** | **PCD10** |
| Test kit | 1 | Instrument | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | Plastic pH electrode 201T-H | ✓ | - | - | - | ✓ | ✓ | - | ✓ | ✓ |
| 3 | Plastic ORP electrode ORP301 | - | ✓ | - | - | - | - | - | ✓ | - |
| 4 | Stainless Temp electrode TEMP-02H | - | ✓ | - | - | - | - | - | ✓ | - |
| 5 | Plastic Cond electrode CON201T | - | - | ✓ | - | ✓ | - | ✓ | - | ✓ |
| 6 | Plastic DO electrode DO01-2M-H (Polarographic) | - | - | - | ✓ | - | ✓ | ✓ | - | ✓ |
| 7 | pH buffer solution:  50mL pH4.00/7.00/10.01ea | ✓ | - | - | - | ✓ | ✓ | - | ✓ | ✓ |
| 8 | ORP standard solution：50mL 222mV, 1btl | - | ✓ | - | - | - | - | - | ✓ | - |
| 9 | Cond standard solution:  50mL 84μS/1413μS/12.88mS/cm ea | - | - | ✓ | - | ✓ | - | ✓ | - | ✓ |
| 10 | DO electrolyte solution: DOS-01: 30mL 1btl | - | - | - | ✓ | - | ✓ | ✓ | - | ✓ |
| 11 | DO sensor cap DOSC：3pcs/pk | - | - | - | ✓ | - | ✓ | ✓ | - | ✓ |
| 12 | Charging lithium battery:  H10-LI01（pre-installed in） | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 13 | Data/Charging cable: 1pc | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 14 | Carrying case:  (L×W×H: 33.0×27.2×8.2cm) | ✓ | ✓ | ✓ | ✓ | - | - | - | - | - |
| 15 | Carrying case:  (L×W×H: 36.0×32.0×9.0cm) | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ |

## 

## 1.2 Key features

* + 3.5″TFT Color Display, easy to read.
  + Adopts digital filtering and slip technology to intelligently improve the response speed of the instrument and the accuracy of measurement data.
  + When the measurement is stable, the smile icon stays on the screen, and you can lock the reading manually or automatically.
  + pH module: automatic temp compensation, auto calibration, auto recognize pH buffer solution series, as USA/NIST/CN; Cal points:1-3pts.
  + Cond module: automatic temp compensation, auto calibration, auto recognize standard solution, switch measurement unit: Cond/RES/TDS/SAL，Unique 1-pt conductivity calibration, easy to use.
  + Dissolved Oxygen module: the polarographic DO has a built-in temp sensor, auto temp compensation, auto air pressure compensation. Each DO electrodes comes with three backup membrane caps, convenient for long-term use.
  + Data Synchronize/Charging port: Type-C, in line with the European new regulations.
  + Waterproof and dustproof rating: IP57.
  + Features of the PC software:
  + Sample ID identification
  + User level management
  + Operation history record
  + Data print/export
  + Timing data logger

# Technical specifications

**2.1. pH**

|  |  |
| --- | --- |
| Measurement Range | (-2.000-20.000) pH |
| Resolution | 0.1/0.01/0.001 pH |
| Accuracy | ±0.002pH ± one digit |

**2.2 mV**

|  |  |
| --- | --- |
| Measurement Range | (-1999.9 - +1999.9) mV |
| Resolution | 1mV |
| Accuracy | ±0.03% F.S ± one digit |

**2.3 Conductivity (TDS/Sal/Res)**

|  |  |
| --- | --- |
| Measurement Range | 0-2000.0mS/cm, auto divided by range：  0-19.99μS/cm; 20.0-199.9μS/cm; 200-1999μS/cm; 2.00-19.99mS/cm; 20.00-199.9mS/cm; 200.0-2000mS/cm(K=10.0)  Match test range: 0-200mS/cm  TDS: 0-100.0g/L (TDS factor adjustable)  Res: 5.000Ω·cm-100.0MΩ·cm, Sal: (0.00-8.00) % |
| Resolution | 0.001/0.01/0.1/1 |
| Accuracy | ±0.5 % FS ± one digit |
| ATC range | (0-50）℃ (auto) |
| Electrode constant | K= 0.1 / 1.0 / 10. 0cm-1 |
| Reference temperature | 25℃, 20℃, and18℃ |

**2.4 Dissolved oxygen**

| Measurement Range | (0.00-20.00）mg/L; (0-200.0) % |
| --- | --- |
| Resolution | 0.1/0.01 |
| Accuracy | ±0.30 mg/L |
| Response time | 30s≤ (25℃, 90% response) |
| Residual current | ≤0.1 mg/L |
| Temp. compensation range | (0-50) ℃ (automatic) |
| Air pressure compensation range | （0-200.0）kPa (automatic) |
| Salinity compensation range | （0-45）ppt (manual) |
| Auto calibration | Water saturated air/air saturated water |
| Electrode type | Polarographic type |

|  |  |
| --- | --- |
| Data storage | 3000 groups |
| Charging port | Type-C |
| Power supply | Rechargeable lithium battery, Type-C USB |
| IP rating | IP57 |

* 1. **Others**

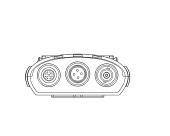
# Descriptions

## 3.1 Measurement screen

* Long press to power on.
* Short press to move, when the ion highlighted, press to start the mode selection, pH/MV→ORP→COND(RES/TDS/SAL) →DO(SAT).
* When confirmed, the meter returns to measurement mode automatically.

****

## 3.2 Meter socket



|  |
| --- |
| 8 pins-measure dissolved oxygen |
| 4 pins-measure conductivity /temperature |
| BNC-measure pH/ORP |

## 3.3 Operation keys

|  |  |
| --- | --- |
|  | Long press to power on/off |
|  | Shortcut key to enter Cal mode |
|  | * Parameter setting confirmation * Calibration confirmation |
|  | * Exit Cal mode * Exit parameter setting |
|  | * Press to enter parameter setting * In the measurement mode, long press to change the pH resolution: 0.1/0.01/0.001 |
|  | Parameter selection |
|  | Parameter selection |

****

## 3.4 Display icons

Press to move, when the icon below highlighted, press to start settings

|  |  |
| --- | --- |
|  | Hold/release data manually |
|  | Enter parameter setting  In the data review mode, long press to delete all the saved data. |
|  | Save the readings manually (number, parameter, data, temperature, data) |
|  | In the measurement mode, press to check data saved. (press to scroll screen) |
|  | Timing data storage (0.5m, 1m, 2m, 3m, 5m, 10m, 20m, and 30m; OFF) |
|  | Choose the parameter : pH→mV→ORP→COND(RES/TDS/SAL) →DO(SAT) |

## **3.5 General parameter setting**

Others

Date

Manual Temp compensation



*Press* **SET** *to move the decimal point*



*Press* **SET** *to move.*

*Press to change the settings*





# Instrument checking

* Check the package content with list.
* Check the appearance of the instrument. The electrode connect should be kept dry and clean. The electrode should not be damaged.

# pH module

## 5.1 pH parameter setting

* Long press to power on, the pH module display screen as shown right.
* Short press to move, when the icon highlighted, press to enter the Mode settings, you can check the mV value of pH measuring.
* The pH Submenu settings:



*Ammonia added purified water selection*

*pH buffe series*

## 5.2 pH calibration and measurement

**5.2.1 Before use**

* Connect the pH electrode to the meter socket. BNC to the pH, mini-BNC to the temp socket;
* Long press to power on. About the temperature compensation icons:

**ATC**: when the mini-BNC connected, the meter goes to automatic Temp. compensation mode.

**MTC**：If you`d like to set the temperature compensation manually, leave the mini-BNC socket empty. (See the ways to set the temperature manually in P3.5)



Diagram 1

**5.2.2 Calibration**

* Screw off the pH electrode protection cap.
* Pour certain pH buffer solution in beak and prepare some purified water separately.
* Press to enter calibration mode, “1” flickering in red as the Diagram 1 reminding of the 1st point calibration.
* Rinse the electrode in purified water, and shake-dry, do not touch the electrode bulb.
* Gently stir the electrode in pH7.00 buffer solution, let it stand, press to confirm the calibration when the smile icon stays on the screen.



Diagram 2

* The “1” turns green. The 1st point calibration was conducted already (as in Diagram 2）, and “2” flickering reminds of 2nd point calibration.
* Press to conduct the 2nd and 3rd pts calibration with pH4.00/10.01 buffer solution if multi-pts calibration is required, and all the calibrated points icons will show up together with the electrode sensitiveness level “☆☆☆” on the middle of the screen.
* If you`d like to take only one point calibration, after the 1st calibration performed, press **ESC** to cancel the following calibration. When the tip (as in Diagram 3) appears, press to exit calibration, and the meter returns to measurement mode automatically.



Diagram 3

**5.2.3 Measurement**

* After calibration, rinse the electrode in pure water and shake-dry.
* Immerse the electrode in sample solution, stir gently, let it stand still, get the readings when the smile icon stays on the screen.
* If the auto-hold function was preset, the readings will be hold automatically now. You can short press to move, when the icon highlighted, press to release the data.
* In the measurement mode, long press SET to change the pH resolution: 0.1/0.01/0.001

## 5.3 pH measurement notes

1. For the most accurate pH measurements, the temperature of the sample solution and the calibration solution should be as the close.
2. The tester is calibrated at the factory. (the calibrated points and electrode sensitive level icon stay on the screen). You can perform 1 to 3-pt calibration with a known, reliable pH buffer solution as required. The pH7.00 is suggested for the 1st point calibration, then followed by the acid (pH4.00) or alkaline (pH10.01) point calibration. If you`d like to perform a two-point calibration, the 2nd pH buffer solution should cover the sample solution pH value. For example, if the pH value of the sample solution is known as pH5, using a pH4.00 buffer solution would be best. The meter can automatically recognize the buffer solution as the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cal points** | **USA** | **NIST** | **CH** | **Recommended** |
| 1 point | 7.00pH | 6.86pH | 6.86 pH | ≤ ±0.1pH |
| 2 points | 7.00pH/4.00pH | 6.86pH/4.01pH | 6.86pH/4.00pH | <7.00 pH |
| 7.00pH/10.01pH | 6.86pH/9.18pH | 6.86pH/9.18pH | >7.00 pH |
| 3 points | 7.00pH/4.00pH/10.01pH | 6.86pH/4.01pH/9.18pH | 6.86pH/4.00pH/9.18pH | 0-14.00pH |

1. Do not pour the solution back after use to avoid contamination.
2. Strong acid, strong alkali, and organic solutions will accelerate the aging of the electrode bulb and the plastic shell solvent. Please avoid testing such substances.
3. The frequency of calibrating a pH meter depends on the sample solution tested, electrode performance, and the requirement of the accuracy. The higher the usage and the amount of contamination, the more often you need to calibrate your pH meter. For high-accuracy measurements (≤ ±0.02pH), it is necessary to perform calibration before every test. For the general accuracy (≥±0.1 pH), once calibrated, the meter can be used for a week or longer. In the following cases, it is advisable to calibrate your pH meter:

* When you use a new electrode or when the electrode hasn’t been used for a long time.
* After the electrode has been cleaned.
* After measuring a strong alkaline solution or a strong acidic solution.
* After measuring the fluoride-containing solution or organic solution.
* There is a significant temperature difference between the test sample and the buffer solution.
* Restore the meter to factory default settings.

1. The electrode is immersed in pH/ORP soaking solution (3 mol/L KCl) to keep the pH membrane sensitivity. If the electrode storage solution is contaminated, please wash the bottle clean and fill in new storage solution.
2. Always keep the electrode connector clean and dry. Use cotton balls with isopropyl alcohol to clean if it gets dirty, and then blow-dry it. This is to prevent a potential short circuit, which will undermine the electrode’s performance.
3. There occasionally would be some white KCL crystals surrounding the electrode protective cap after long-term storage, this is a normal phenomenon and will not affect the electrode performance. Just rinse it in deionized water.
4. Every pH electrode undergoes a natural aging process. With aging, the responding behavior becomes slower and slower, and the electrode slope and asymmetry change. Moreover, extreme operating conditions can considerably shorten the lifetime of the electrode. For serious passivation, the user could renew the electrode by submerge the electrode tips in 4%HF (hydrofluoric acid) for around 5-8 seconds, rinse it in deionized water, and then submerge in pH soaking solution for at least 30 minutes to renew it. If the probe still fails calibration, please replace a new one.
5. Besides the general contamination cleaning, you can clean contaminated glass bulbs and junction as below.

|  |  |
| --- | --- |
| **Contamination** | **Cleaning Solution** |
| Inorganic metal oxide | Diluted acid less than 1mol/L |
| Organic lipid | Dilute detergent (weak alkaline) |
| Resin macromolecule | dilute alcohol, acetone, ether |
| Proteinic haematocyte sediment | Acidic enzymatic solution (saccharated yeast tablets) |
| Paints | Dilute bleacher, peroxide |

*Note:*

*HF (Hydrofluoric acid) is highly toxic and should be handled with caution in a fume hood.*

***Note***

***Never*** *store the pH electrodes in pure water such as RO water, tap water, distilled water, deionized water, or organic solution as they will cause damage to the electrode.*

***Never*** *rub the electrode tip with a cloth or hand, this will introduce an undesirable static electricity into the glass shaft of the electrode and prolong the response time considerably.*

# ORP module

## 6.1 ORP measurement



Diagram 4

Diagram 5

* Long press to power on.
* Short press to move, when highlighted, press to enter mode selection (as in the Diagram 4).
* Shore press to select ORP, and press for confirmation, the meter enters ORP measurement automatically.
* Connect the ORP electrode to the BNC socket (model no.: DORP301).
* ****Rinse the electrode in purified water, and shake-dry.
* Immerse the electrode in sample solution, stir gently, let it still, get the readings when the smile icon stays on the screen (as in the Diagram 5).
* If the auto-hold function was preset, the readings will be hold automatically now. You can short press to move, when the icon highlighted, short press to release the data.
* Connect a temperature probe (model no.: DTEMP-02H) to the TEMP socket, if you`d like to take the temperature reading of the sample solution.

## 6.2 ORP measurement notes

* + In ORP measurement, there is no need of temperature compensation. If there`s doubt about the quality of the ORP electrode or the test results, you can use the ORP standard solution to test its mV value to determine whether the ORP electrode or instrument is accurate or not.
  + The surface of the ORP measurement electrode (platinum or gold) should be bright. When the electrode used over a long period, the platinum surface will get polluted, which causes inaccurate measurement and slow response. In this case, please refer the following methods for cleaning and activation:

1. For inorganic pollution, immerse the electrode in 0.1mol/L dilute hydrochloric acid for 30 minutes, washed with pure water, and then immerse it in the pH soaking solution for 6 hours before use.
2. For organic oil and oil film contamination, clean the platinum surface with detergent, then rinse the electrode in pure water. After that, submerge the electrode in electrode soaking solution for 6 hours before use.
3. For heavily polluted platinum surface on which there is oxidation film, polish the platinum surface with toothpaste, then wash it in distilled water, then submerge it in the 3M soaking solution for 6 hours.

# COND module

## 7.1 Cond parameter setting



Diagram 6

* Long press to power on, the Cond module display screen as in the Diagram 6.
* Short press to move, when the icon highlighted, press to enter the Mode settings,

## 7.2 Cond submenu setting

Reference temperature settings. Default: 25.0℃



Conductivity standard solution series. Default: USA

③

⑦

Temperature compensation factor of the solution. Default: 2%

Electrode constant setting. Default: 1.0

TDS factor setting. Default: 0.5

## 7.3 Conductivity calibration and measurement

⑥

**7.3.1 Before use**

Connect the Cond electrode to the Cond socket (4-pins). The meter shows ATC automatically.

**7.3.2 Calibration**



Diagram 7

* Screw off the conductivity electrode protection cap.
* Pour certain conductivity solution in beak and prepare some purified water separately.
* Press to enter calibration mode, as show in the Diagram 7.
* Rinse the electrode in purified water, and shake-dry.
* Immerse the electrode in 1413μS/cm standard solution, stir gently and let it stand, press to confirm the calibration when the smile icon stays on the screen.



Diagram 8

* The meter shows the electrode constant, and standard solution calibrated, as shown in the Diagram 8, the 1-pt calibration finished.
* Press to enter measurement mode.

**7.3.3 Measurement**

* After calibration, rinse the electrode in pure water and shake-dry.
* Submerge the electrode in sample solution, stir gently, let it stand still, get the readings when the smile icon stays on the screen.
* If the auto-hold function was preset, the readings will be hold automatically now, you can short press to move, when the icon highlighted, press to release the data.



Diagram 8

* Short press to move, when the icon highlighted, press to select other mode, as RES/TDS/SAL.
* When the meter is equipped with a conductivity electrode, K=10.0, the measurement range would expand to 2000mS/cm.

## 7.3 Notes about the conductivity

1. The tester is calibrated at the factory. You can use directly.
2. The resistivity, TDS, and salinity is converted from conductivity, doesn't need to be calibrated. When needed, you can perform the conductivity calibration.
3. For the normal use, it is advisable to calibrate the meter once a month or after being used for a period of time. Always keep the conductivity electrode rods clean. Before measurement, rinse it clean with pure water and shake-dry, and rinse it with the sample solution would be better.
4. This instrument supports electrode constant calibration and standard solution calibration. Clause 7.3.2 is the way of standard solution calibration. When you have an accurate, reliable standard conductivity solution, the standard solution calibration method will be more accurate. If you are used to the constant calibration, you can set the electrode constant in the “Electrode constant” as in Clause 7.2. Both methods can be selected arbitrarily and will not affect each other.
5. In the parameter setting clause 7.2, there`s two series of the standard solution to choose from. as shown below.

USA: 84.0μS/cm, 1413μS/cm, 12.88 mS/cm, and 111.9 mS/cm

CH: 146.6μS/cm, 1408μS/cm, 12.85mS/cm, and 111.3mS/cm

1. The instrument comes with three bottles of standard solution: 84μS/cm, 1413μS/cm, and 12.88mS/cm. The default conductivity electrode (K=1.0cm-1) can be used within the range of less than 100 mS/cm after calibrating with a 1413μS/cm calibration solution. For the details, the user can make the choice according to the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measuring range | 0.05～20μs/cm | 0.5μs/cm～200ms/cm | | |
| Electrode constant | K=0.1cm-1  (with a flow cell) | K=1.0cm-1 | | |
| Calibration solution USA series | 84μS/cm/ | 84μS/cm | 1413μS/cm | 12.88mS/cm, 111.9 mS/cm |
| Calibration solution CN series | 146.6μS | 146.6μS | 1408μS | 12.85mS, 111.3mS/cm |

1. The conductivity electrode is coated with a fluffy platinum black layer, to minimize the polarization effect and enlarge the measurement range. Therefore, **Do Not** wipe the platinum rod, you can rinse it in water or use warm detergent to clean the organic contamination, or use alcohol to clean it.
2. Before use, the conductivity electrode is soaked in pure water, to prevent the platinum black to be passivated. If found the platinum black plated electrode is invalid, you can immerse it into 10% nitric acid solution or 10% hydrochloric acid for 2 minutes, then rinse it with purified water and again test. If the test still fails, the platinum black needs to be recoated, or replacing a new conductivity electrode.
3. The default setting of the temp. compensation factor is 2.0%/˚C. User can adjust the factor based on sample solution and experimental data in parameter setting (see clause 7.2). The following table is some examples for setting up the temp. compensation factor.

|  |  |
| --- | --- |
| **Solution** | **Temperature compensation coefficient** |
| NaCl | 2.12%/℃ |
| 5%NaOH | 1.72%/℃ |
| Dilute ammonia | 1.88%/℃ |
| 10% Hydrochloric acid | 1.32%/℃ |
| 5% Sulfuric acid | 0.96%/℃ |

**Note:**

**When the coefficient for the temperature compensation is set to 0.00 (no compensation), the measurement value will be based on the current temperature.**

# DO Module

## 8.1 DO menu setting



Diagram 9

Diagram 10

* Long press to power on.
* Short press to move, when the icon highlighted, press to enter the Mode selection, as in Diagram 9.

**8.2 DO submenu setting**

Short press to move, when the icon highlighted, press to enter the Mode settings.

****



Manual salinity compensation



Automatic barometric compensation.

Press SET to move the decimal digit.

## **8.2 DO calibration and measurement**

**8.2.1 Before use**

* Check on the DO electrode: see the Diagram 11. There should be no air bubbles in the electrode sensor cap. If there is. Screw off the sensor cap, and refill DO electrolyte full. (It is normal if there`s few DO electrolyte dripping during this process).

Diagram 11

* Connect the DO electrode to the powered-on meter without measurement or calibrating. Let the electrode polarization consume the remaining oxygen inside the inner solution of the membrane cap so as to ensure fast response and high accuracy. The polarization time should be 15-30 minutes.

1. DO sensor cap
2. DO electrode shaft
3. Anode (silver)
4. Cathode (platinum)
5. Temp. sensor



Diagram 12

Diagram 13

**8.2.2 DO calibration**

**Full Saturated oxygen calibration:**

* Press to enter calibration mode, as show in the Diagram 11.
* Place the electrode in air, wait for the green smile icon displays, press to confirm the calibration, and the “Full oxygen calibration completed” (as the Diagram 13) on the screen reminds of the calibration completed.
* Press to confirm and the meter turns to measurement mode.

**Zero oxygen calibration:**

Usually there is no need to do zero oxygen calibration unless you have a high requirement for accuracy in low oxygen level (<1.0ppm) or you are replacing the DO electrode, DO sensor cap, and long term not in use. To do zero oxygen calibration, follow the steps below:

* Prepare 100mL of zero-oxygen water: In a 100 mL beaker, add in 5.0g anhydrous sodium sulfite (Na2SO3) and distilled water to 100 mL, mix well to dissolve. Note that the zero-oxygen water is only effective within 24 hours.
* Polarize the meter for 15 minutes, and calibrate the meter as Clause 8.2.2.
* Submerge the DO in zero oxygen water, enter the calibration mode, wait for the green smile icon displays, press for calibration confirmation. The meter conducted the calibration in a few minutes. Rinse the electrode in pure water.
* If the reading is less than 0.02 ppm after 5 minutes, it means the electrode is in good condition and there is no need to perform zero oxygen calibration. Just press to return to measurement mode.
* If the reading is greater than 0.15 ppm after 5 minutes, it’s time to replace the membrane cap according to section 8.4 or remove the membrane cap and use a Super-fine polishing paper to lightly polish the platinum cathode according to section 8.4. Then perform the saturated air calibration and zero oxygen calibration before measurement.
  + 1. **DO Measurement**
* **In the flowing water** (water speed >5cm/s):

Power on the meter, place the DO electrode into the flowing water. The water surface should be higher than the location of temperature sensor. The angel between the electrode and the water surface should be around 45° to 75°, Hold the electrode and get the readings when the smile icon stays on the screen (typically takes 1-5 minutes).

* **In the static water**:

Power on the meter, place the DO electrode into the flowing water，The water surface should be higher than the location of temperature sensor. The angel between the electrode and the water surface should be around 45° to 75°, move the electrode in water fast (>5cm/s) around 3-5 minutes. When the reading is fully stabilized, record the measurement (DO NOT stop the moving while recording the measurement).

**Never** stop the DO electrode from moving in static water while measuring. Otherwise, the Dissolved Oxygen in solution will be consumed continuously, the DO reading will keep dropping, and the DO readings will be lower than the actual.

## 8.3 Notes about the DO test

1. When calibration, the temperature difference between the sample solution and the air should be the close(≤10℃), If the temperature difference is too large, you can immerse the DO electrode in the sample water for about 10 minutes, and then perform the calibration immediately.
2. The electrode requires polarization after each power on. Do not turn off the meter when in use.
3. Temperature impacts the DO measurement significantly. When the electrode temperature and water temperature have larger difference, the reading time must be greater than 3 minutes. Otherwise, there could be some large errors.
4. The salinity and air pressure also affect DO measurement. The meter has automatic air pressure compensation and manual salinity compensation, you can input the value from the parameter setting as in Clause 8.1.
5. To avoid the error caused by the inaccurate Temp. compensation, the surface of the water must be higher than the temperature sensor location as shown on the right.
6. When the meter performs abnormal, you can restore the meter to factory default settings, and conduct the calibration before measurement.

## 8.4 DO sensor cap replacement

When the DO electrode’s response time becomes slower, obvious errors occur in measurement, or when the sensitive membrane of DO electrode is wrinkled, cracked or damaged at any extent (the well-functioning membrane surface should look perfectly smooth), it’s time to replace a new membrane cap according to the following steps.

* Screw off the membrane cap.
* Rinse the electrode without membrane cap with distilled water and shake-off excess water.
* Clean on the cathode surface (gold slice) with a clean tissue.
* Add new inner solution into a new membrane cap slowly and do not let any air bubbles appear. If you found any air bubbles in the cap, carefully flick on the membrane cap to eliminate them.
* Place the membrane cap on the table and put in the electrode vertically, slowly twist in, and then screw on the cap tightly. The excess inner solution will be squeezed out. Please wipe it off with tissue and rinse off the electrode in distilled water.
* Check if there are any air bubbles in electrolyte (except for the smaller air bubbles), If so, reassembly is needed. Do not touch the sensitive membrane with fingers directly because the sweat and grease will affect the quality of the membrane.

# Data storage

**Manual data storage:**

In the measurement mode, press to move, when the icon highlighted, press to save data.

**Automatic data storage:**

 In the measurement mode, press to move, when the  icon highlighted, press to select the interval storage period. Press to confirm selection. The meter enters automatic interval data storage mode with a beep reminder for each storage. (OFF: cancel the automatic storage setting）

**Data erase**

This instrument can store up to 3000 groups of data. When the storage room is full, new data will automatically overwrite the recently stored value.

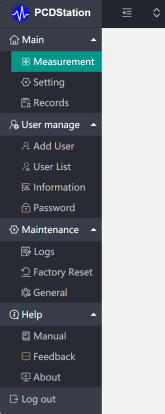
* In the measurement mode, press to move, when the  icon highlighted, press to enter the data review mode,
* Long press SET, all the data saved will be erased immediately.

# PC communication

* Long press to power on the meter
* When the PC software installed (contact supplier for the PC software), connect the data synchronized cable to the meter and USB port respectively.
* Click the icon to login, the default name “Admin” and password “admin”, the PC software displays a successfully connection as below, (also there`s a computer icon on the meter screen), click **Start** to use.



* The PC interface and sub-menu definition



Parameter/Data hold/Interval storage/Sample ID

General parameter settings, meter operation lock

PC records view/print/export/delete

Instrument records export

**Main mode**

Add new User

Check the User List

**User Manage multi-level user management**

The user information view

Update password

Operation history record

Factory reset

The PC Operation beep settings. Instrument ID

**Help information**

Quick manual

Feedback

About us

**Maintenance**

# Warranty

**The warranty covers (from delivery)：**

We warrant the tester against defects in material and workmanship when used in a normal manner for a period of two (2) years (12 months to the electrode).

Note: The electrodes are consumables, and the service life depends on careful maintenance, usage conditions, frequency of use, etc. Within 12 months from delivery, if the user finds that the electrode cannot be used due to processing and manufacturing problems when unpacking it for use, it can be repaired or replaced free of charge.

**The limited warranty does not cover the following:**

* Wear and tear to parts.
* Accidental damage, as the pH bulb broken from shocking.
* Misuse, uncarefully handling.
* Unauthorized maintenance, soldering, counterfeiting and others.

# Appendix A： Content of saturated oxygen in water at different temperatures

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Temp**  **℃** | **DO**  **mg/L** | **Temp**  **℃** | **DO**  **mg/L** | **Temp**  **℃** | **DO**  **mg/L** |
| **0** | 14.64 | 16 | 9.86 | 32 | 7.30 |
| **1** | 14.22 | 17 | 9.66 | 33 | 7.18 |
| **2** | 13.82 | 18 | 9.46 | 34 | 7.07 |
| **3** | 13.44 | 19 | 9.27 | 35 | 6.95 |
| **4** | 13.09 | 20 | 9.08 | 36 | 6.84 |
| **5** | 12.74 | 21 | 8.90 | 37 | 6.73 |
| **6** | 12.42 | 22 | 8.73 | 38 | 6.63 |
| **7** | 12.11 | 23 | 8.57 | 39 | 6.53 |
| **8** | 11.81 | 24 | 8.41 | 40 | 6.43 |
| **9** | 11.53 | 25 | 8.25 | 41 | 6.34 |
| **10** | 11.26 | 26 | 8.11 | 42 | 6.25 |
| **11** | 11.01 | 27 | 7.96 | 43 | 6.17 |
| **12** | 10.77 | 28 | 7.82 | 44 | 6.09 |
| **13** | 10.53 | 29 | 7.69 | 45 | 6.01 |
| **14** | 10.30 | 30 | 7.56 |  |  |
| **15** | 10.08 | 31 | 7.43 |  |  |

# Appendix B：Content of saturated oxygen at different air pressure

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Air pressure** | | **DO（mg/L）** | | |
| **MmHg** | kPa | 15℃ | 25℃ | 35℃ |
| **750** | 100.00 | 9.94 | 8.14 | 6.85 |
| **751** | 100.13 | 9.96 | 8.15 | 6.86 |
| **752** | 100.26 | 9.97 | 8.16 | 6.87 |
| **753** | 100.40 | 9.98 | 8.17 | 6.88 |
| **754** | 100.53 | 9.99 | 8.18 | 6.89 |
| **755** | 100.66 | 10.00 | 8.20 | 6.90 |
| **756** | 100.80 | 10.01 | 8.21 | 6.91 |
| **757** | 100.93 | 10.03 | 8.22 | 6.92 |
| **758** | 101.06 | 10.04 | 8.23 | 6.93 |
| **759** | 101.20 | 10.07 | 8.24 | 6.94 |
| **760** | 101.33 | 10.08 | 8.25 | 6.95 |
| **761** | 101.46 | 10.09 | 8.26 | 6.96 |
| **762** | 101.60 | 10.11 | 8.27 | 6.97 |
| **763** | 101.73 | 10.12 | 8.28 | 6.98 |
| **764** | 101.86 | 10.14 | 8.30 | 6.99 |
| **765** | 102.00 | 10.15 | 8.31 | 7.00 |
| **766** | 102.13 | 10.16 | 8.32 | 7.01 |
| **767** | 102.26 | 10.18 | 8.33 | 7.02 |
| **768** | 102.40 | 10.19 | 8.34 | 7.02 |
| **769** | 102.53 | 10.21 | 8.35 | 7.03 |
| **770** | 102.66 | 10.22 | 8.36 | 7.04 |
| **771** | 102.80 | 10.23 | 8.37 | 7.05 |
| **772** | 102.93 | 10.25 | 8.39 | 7.06 |
| **773** | 103.06 | 10.26 | 8.40 | 7.07 |
| **774** | 103.19 | 10.28 | 8.41 | 7.08 |
| **775** | 103.33 | 10.29 | 8.42 | 7.09 |

# Appendix C: Content of saturated oxygen at different altitude

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Altitude** | | **Air pressure** | | **DO** | **Altitude** | | **Air pressure** | | **DO** |
| **foot** | meter | kPa | mmHg | mg/l | foot | meter | kPa | mmHg | mg/l |
| **0** | 0 | 101.3 | 760 | 8.25 | 7500 | 2287 | 77.1 | 579 | 6.28 |
| **500** | 152 | 9934 | 746 | 8.09 | 8000 | 2439 | 75.63 | 568 | 6.16 |
| **1000** | 305 | 97.6 | 733 | 7.95 | 8500 | 2591 | 74.44 | 559 | 6.06 |
| **1500** | 457 | 95.87 | 720 | 7.81 | 9000 | 2744 | 72.97 | 548 | 5.94 |
| **2000** | 610 | 94.28 | 708 | 7.68 | 9500 | 2896 | 71.64 | 538 | 5.83 |
| **2500** | 762 | 92.54 | 695 | 7.54 | 10000 | 3049 | 70.17 | 527 | 5.71 |
| **3000** | 915 | 90.95 | 683 | 7.41 | 10500 | 3201 | 68.84 | 517 | 5.61 |
| **3500** | 1067 | 89.35 | 671 | 7.28 | 11000 | 3354 | 67.38 | 506 | 5.49 |
| **4000** | 1220 | 87.75 | 659 | 7.15 | 12000 | 3659 | 66.58 | 500 | 5.42 |
| **4500** | 1372 | 86.15 | 647 | 7.02 | 13000 | 3963 | 65.78 | 494 | 5.36 |
| **5000** | 1524 | 84.56 | 635 | 6.89 | 14000 | 4268 | 64.98 | 488 | 5.29 |
| **5500** | 1677 | 83.09 | 624 | 6.77 | 15000 | 4573 | 64.18 | 482 | 5.23 |
| **6000** | 1829 | 81.63 | 613 | 6.65 | 16000 | 4878 | 63.38 | 476 | 5.16 |
| **6500** | 1982 | 80.03 | 601 | 6.52 | 17000 | 5183 | 62.58 | 470 | 5.10 |
| **7000** | 2134 | 78.56 | 590 | 6.40 | 18000 | 5488 | 61.79 | 464 | 5.03 |

Conversion of mmHg to kPa:

mmHg×0.13333=kPa

e.g. 200 mmHg = 200 × 0.133 = 26.6 kPa.

DOpt=P×DOt÷760

Note：DOpt— DO concentration under temperature **t**, air pressure **P**, mg/L;

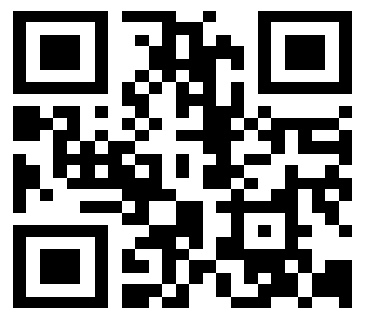
P — air pressure, mmHg;

DOt — DO concentration under temperature **t**, air pressure 760mmHg, mg/L;

760 — air pressure, mmHg.

# Appendix D: Troubleshooting

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Error** | **Reason** | **How to solve problem** |
| 1 | Can`t power on | No battery power | Charge the batter |
| Inactive power key | Contact the supplier |
| 2 | Incorrect Temp. readings | The Temp. thermistor failure | Replace electrode |
| 3 | Strokes missing | LCD screen defective | Contact the supplier |
| 4 | The reading is nearly stable in all kinds of solutions | Short circuit | * Step 1: Replace electrode * If still in failure with Step 1, contact the supplier for meter maintenance |
| 5 | Calibration failure | * Electrode aging * Air bubbles surrounding the electrode shield * Incorrect/Expired calibration solution * The electrode was not activated | * Replace electrode * Stir in the solution to remove the air bubble * Always Cal with pH7.00 and fresh solutions. * Soak in the pH/ORP electrode soaking solution for at least 30 minutes |
| 6 | Reading keeps jumping/  Response slow/  Readings won`t stabilize | * There`s impurities surrounding the bulb/ junction * pH electrode aging * There`s air bubble in the electrode | * Rinse clean * Replace electrode * Shake the electrode, to remove the air in the electrode |
| 7 | the Conductivity Reads “0” | No current flow tested | * Front tip of the conductivity electrode should be completely immersed in the solution. * When placing conductivity electrodes in solutions, avoid placing them in "dead" corners.   For the measurement of high-purified water, it must be measured in a flow cell, and the flow rate should not be too high. |



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