SX800 Series of Portable Electrochemical Meter

Manual

SX811 Portable pH Meter ☐

SX813 Portable Conductivity Meter ☐

SX816 Portable Dissolved Oxygen Meter ☐

SX823 Portable pH/Cond. Meter ☐

SX825 Portable pH/DO Meter ☐

SX836 Portable pH/Cond./DO Meter ☐

ISO9001:2008 IP57 WATERPROOF

SX800 Version2.0

Table of Contents

1. Introduction

Thanks for buying and using the model SX800 pH/mV/Conductivity/DO Meter (the following called “meter” in short).

This meter is a perfect combination with the most advanced electronic technology, sensor technology and software design. The meter includes 6 types and can measure 8 parameters. It is the best portable water analysis meter with the highest performance and the lowest cost. It is suitable for the trade such as the mining industry, power plant, water treatment projects and environmental protection, etc., especially has more extensive application in the field and spot test.

Before using this meter, please read the operation manual carefully in order to help use and maintain it correctly. On the basis of improving instrument of performance constantly, we reserve the right of changing the content of this manual and accessories in case of not notifying in advance.

1.1. Measurement parameters

Measuring parameters	SX811	SX813	SX816	SX823	SX825	SX836
pH/mV	√			√	√	√
Cond./TDS/Sal./Res.		√		√		√
DO			√		√	√
Temp.	√	√	√	√	√	√

1.2. Basic features

Diagram-1 Combined electrode

- **Perfect functions** — The microprocessor-based portable meter features automatic calibration, automatic temperature compensation, menu set-up, self-diagnostics, due calibration reminding, calibration date checking, automatic power-off and low voltage display, etc. The multi-parameter meter is able to measue simultaneously with multiple electrodes, and switch to display. Please see Diagram -1：three electrodes at most can be fit into the clip to measure simultaneously.
- **Data processing** — meet GLP, clock display, manual storage and automatic timing storage, USB port and data saving in case of blackout.
- **Accurate measurement** — the meter’s digital filter improves measurement speed and accuracy. There is reading stability display and automatic lock-up display mode.
- **Structure design** — IP57 water-proof, able to work under rough conditions, soft rubber case, the holder at the back side of the meter is convenient for lab. use, two types of power supply: battery and USB power supply, the durable portable case includes all accessories.

1.3. pH measurement features (suited for model SX811, SX823, SX825 and SX836)

- 1-3 point automatic calibration, the meter provides calibration guide and automatic checking function.
- The meter is able to recognize up to 12 types of pH standard buffer solutions. There are three options of standard buffer solutions: USA series, NIST series and Chinese series (CH), there is also customer-defined solution calibration.
- The meter provides two special modes for pure water and pure water mixed with ammonia. These special modes offer temperature compensation for pH value, especially suitable for the electricity and petrochemical industries.

1.4. Conductivity measurement features (suited for model SX813, SX823 and SX836)

- 4 calibration points can be chosen, the meter provides calibration guide and automatic checking function.
- The meter is able to switch among conductivity, TDS, salinity and resistivity measurement mode. For TDS measurement, the coefficient is adjustable.
- The meter is able to recognize up to 8 types of conductivity standard solutions. There are two options of standard buffer solutions: USA series and Chinese series (CH), there is also customer-defined solution calibration.
- The meter has an automatic range feature with automatic non-linear temperature compensation for pure water and high purity water with conductivity values lower than 10uS/cm greatly improving accuracy and suitable for the electricity, microelectronics and pharmaceutical industries.

1.5. DO (Dissolved Oxygen) measurement features (suited for model SX816, SX825 and SX836)

- DO electrode offers a built-in temperature and salinity sensor with automatic temperature compensation and automatic salinity compensation as well as manual barometric pressure compensation. The measurement is more accurate.
- Polarographic DO electrode with special DO calibration cover, electrode polarization only requires 3-5 min, three combined membranes convenient to renew.

2. Technical Specifications

2.1. Main specifications

	Specifications		Models
pH	Range	(-2.00 ~ 19.99) pH	SX811 SX823 SX825 SX836
	Resolution	0.01/0.1 pH	
	Accuracy	±0.01 pH ±1digit	
	Input current	≤1×10^{-12} A	
	Input impedence	≥1×10^{12} Ω	
	Stability	±0.01 pH/3h ±1 digit	
	Temperature compensation	(0 ~ 100) °C (manual or automatic)	
mV	Range	-1,999mV ~ 0 ~ 1,999mV	
	Resolution	- 200 mV ~ 0 ~ 200 mV: 0.1 mV ; others:1mV	
	Accuracy	±0.1% FS ±1digit	
Conductivity	Range	Cond.:0~200 mS/cm,divided into five ranges: (0.00~19.99) μS/cm (20.0~199.9) μS/cm (200~1999) μS/cm (2.00~19.99) mS/cm (20.0~199.9) mS/cm TDS: (0 ~ 100) g/L, Salinity: (0 ~ 100) ppt, Resistivity: (0 ~ 100) MΩ·cm	SX813 SX823 SX836
	Resolution	0.01/0.1/1μS/cm 0.01/0.1 mS/cm	
	Accuracy	±1.0% FS ±1digit	
	Temperature compensation	(0 ~ 50) °C (manual or automatic)	
	Electrode constant	0.1 / 1 / 10 cm^{-1}	
Dissolved Oxygen	Range	(0 ~ 20.00) mg/L(ppm) (0 ~ 200.0) %	SX816 SX825 SX836
	Resolution	0.01/0.1 mg/L(ppm) 0.1/1 %	
	Indicating value accuracy	±0.30 mg/L	
	Response time	≤30 s (25℃, response at 90%)	
	Zero accuracy	≤ 0.10 mg/L	
	Temperature compensation	(0 ~ 45) ℃ (automatic)	
	Salinity compensation	(0 ~ 45) ppt (automatic)	
	Barometric pressure compensation	(66.0 ~ 199.9) kPa (manual)	
	Electrode type	Polarographic	
Temperature	Range	0~100°C	SX811 SX813 SX816
	Resolution	0.1℃	

	Accuracy	±0.5℃±1digit	SX823 SX825 SX836

2.2. Other specifications:

Data storage	500 groups	SX811，SX813，SX816
	1000 groups	SX823，SX825，SX836
Storage content	Serial number, date, time, measuring value, measuring unit and temperature value	
Output	USB	
Power	AAA batteries × 3 (1.5V× 3) / DC5V adaptor (USB port)	
IP rating	IP57 dustproof and waterproof	
Dimension & Weight	Meter: (88×170×33)mm / 313g Portable case: (360×270×76)mm / 1.6kg	SX811, SX813
	Meter: (88×170×33)mm / 313g Portable case: (480×360×95)mm / 3.2kg	SX816, SX823 SX825, SX836

3. Instrument description

3.1. LCD display：

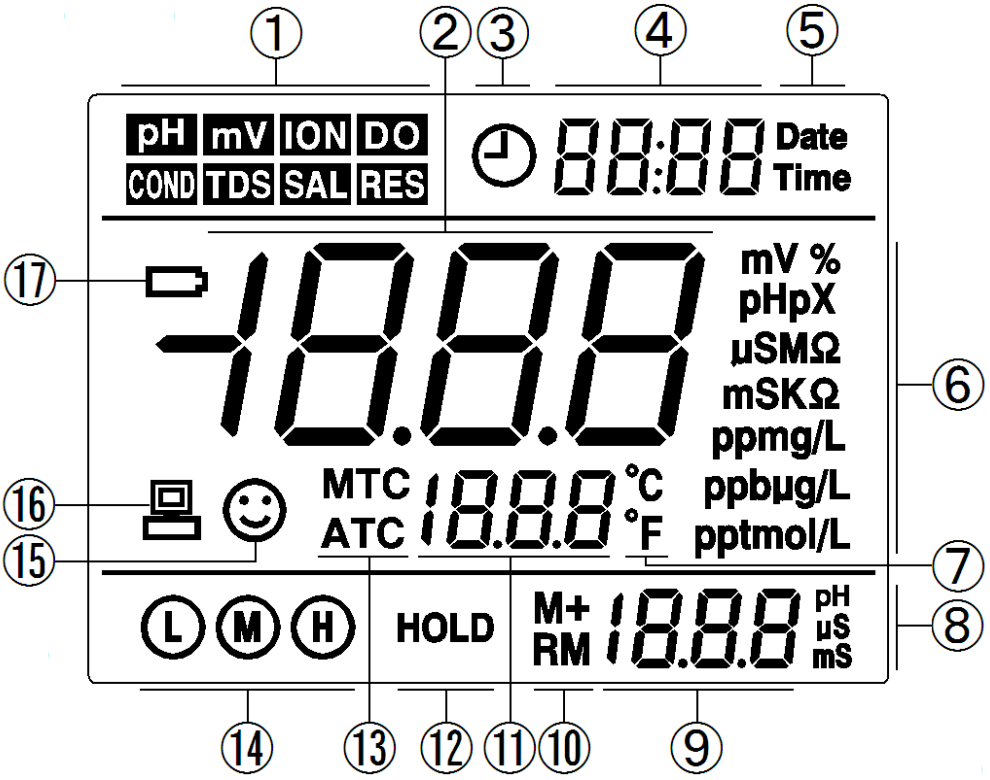


Diagram - 2 LCD

(1) — Measurement mode icons

(2) — Measurement value

(3) — Timing storage icon. When this icon appears, the meter is in the automatic storage mode

(4) — Date and time display value, and prompts of special display mode

(5) — Units of Date and time

(6) — Units of measurement

(7) — Temperature units (°C and °F)

(8) — Units of pH and conductivity calibration value

(9) — pH and conductivity calibration value, the serial number for storage and recall, and prompts of special display mode

(10) — Storage and recall icons

M+ — Measurement to be stored icon, RM — Reading to be recalled icon

(11) — Temperature value and prompts of special display mode

(12) — Automatic reading lock-up icon

(13) — Temperature compensation icons

ATC — automatic temperature compensation, MTC — manual temperature compensation

(14) — Calibration guide icon

(15) — Stability icon of readings

(16) — USB icon，when this icon appears, the meter connects the computer

(17) — Low battery icon, when this icon appears, please renew the battery

3.2. Keypad functions

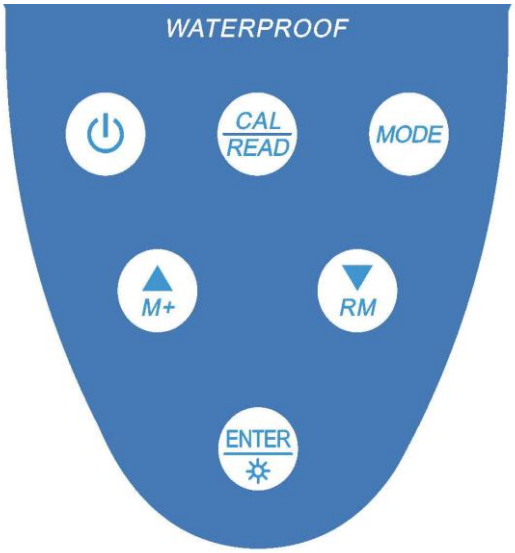


Diagram - 3 Keypad

3.2.1. Keypad operations

Momentary press ----- <1.5 seconds， Long press ----- >1.5 seconds.

3.2.2. Turn on the meter

Press ⏻ to turn on the meter: LCD full display → display the measurement mode (backlight for one minute).

3.2.3. Turn off the meter

Only in the measurement mode, press ⏻ to turn off the meter.

Note: In the calibration mode or the parameter set-up mode, pressing ⏻ is invalid. Please press ENTER key to return to the measurement mode, then press ⏻ to turn off the meter.

Chart – 1 Keypad operations and descriptions

Keypad	Operations	Descriptions
⏻	Momentary press	● Press this key to turn on or turn off the meter.
MODE	Momentary press	Select measurement parameters: ● pH meter: pH → mV , ● pH/Conductivity meter: pH → mV → COND , ● pH/DO meter: pH → mV → DO , ● pH/Conductivity/DO meter: pH → mV → COND → DO .
	Long press	● In the measurement mode, press this key to enter in the main menu.
CAL READ	Momentary press	● In the measurement mode, press this key to enter in the calibration mode, ● In the recall mode (RM), press this key to return to the measurement mode, ● Cancel any operation to return to the measurement mode.
ENTER ✲	Momentary press	● In the measurement mode, press this key to turn on or turn off the backlight, ● In the calibration mode, press this key to make calibration, ● In the main menu mode, press this key to enter in submenu, ● In the submenu mode, press this key to enter in the parameter set-up mode, ● In the parameter set-up mode, press this key to confirm the parameters.
	Long press	● In pH measurement mode, press and hold this key to change the resolution repeatedly: 0.01→ 0.1pH, ● In conductivity measurement (or TDS, salinity and resisitivity) mode, press and hold this key to scroll through TDS→ SAL → RES → COND . . ● In DO mode, press and hold this key to scroll through the DO unit: mg/L→ppm→%.

▲ M+ ▼ RM	Momentary/ long press	● In the mode of manual temperature compensation (MTC), when press and hold this key, the temperature value flashes, then press this key to change the temperature value, and press ENTER to confirm, ● In the measurement mode, press ▲ M+ to store the measuring value, press ▼ RM to recall the stored measuring value, ● In the recall mode (RM), press momentarily this key to change the storage serial number, press and hold this key to change the number quickly, ● In the main menu and submenu mode, press this key to change the serial number of the main menu and the submenu, ● In the parameter set-up mode, press this key to select parameters.

3.3. Meter sockets

Electrode uses BNC, four-pin and eight-pin sockets protected by grey rubber sealing cap. The following Chart-2 are sockets for model SX811, SX813, SX816, SX823, SX825 and SX836:

Diagram-4 Meter socket

Chart – 2 Electrode sockets

Models	Connect Electrode	Description
SX811 SX823 SX825 SX836		**Connect pH electrode** ● BNC socket (middle) — connect pH or ORP electrode, ● Four-pin socket (left) — connect temperature probe
SX813 SX823 SX836		**Connect Conductivity electrode** ● Four-pin socket (left) — connect conductivity electrode
SX816 SX825 SX836		**Connect DO electrode** ● Eight-pin socket (right) — connect DO electrode
SX823 SX836		**Connect pH and Conductivity electrode** ● BNC socket (middle) — connect pH or ORP electrode ● Four-pin socket (left) — connect conductivity electrode ● When connect pH and Conductivity electrode, temperature sensor is shared.
SX825 SX836		**Connect pH and DO electrode** ● BNC socket (middle) — connect pH or ORP electrode ● Four-pin socket (left) — connect temperature probe ● Eight-pin socket (right) — connect DO electrode

SX836		**Connect pH, Conductivity and DO electrode** ● BNC socket (middle) — connect pH or ORP electrode ● Four-pin socket (left) — connect Conductivity probe ● Eight-pin socket (right) — connect DO electrode ● When connect pH, Conductivity and DO electrode, electrode, temperature sensor is shared

Chart – 3 USB socket functions

Functions	Connect to meter	Description
USB communication		● The meter has USB communication function, connecting the meter to a computer by USB cable.
Computer or external power supply		● Computer power supply: connect the meter to a computer by USB cable, ● External power supply: use USB cable and USB adaptor, input voltage: AC110V~220V.

3.4. Display mode

3.4.1. Reading stability display mode

When the measuring value is stable, smiley icon ☺ appears on LCD, see Diagram – 5. If ☺ icon does not appear or flash, please do not get the reading value or make calibration until the measuring value is stable.

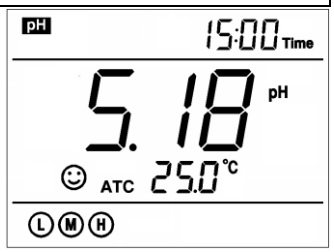


Diagram- 5

3.4.2. Automatic lock-up display mode

Select **On** from parameter P4.6 to turn on automatic lock-up display function. When the reading value stabilizes more than 10 seconds, the meter locks the measuring value automatically and displays **HOLD** icon, see Diagram – 6. In the **HOLD** mode, press CAL/READ to release lock-up.

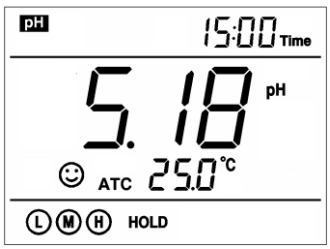


Diagram - 6

3.5. Store, recall and clear readings

3.5.1. Manual storage

When the measurement is stable, press M+ key, the meter displays **M+** icon and storage serial number on LCD, storing measuring information, see Diagram – 7: the meter stores the first group of the measuring value.

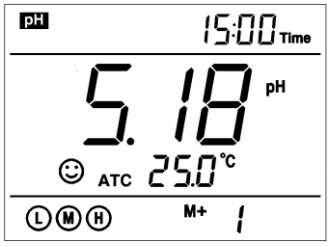


Diagram - 7

3.5.2. Automatic timing storage

Set the storage timing (eg. 3 minutes) from parameter P4.1, 🕘 icon appears on LCD and the meter enters into the timing storage mode. When press M+ key, 🕘 icon flashes and the first measuring value is stored. After 3 minutes, the 2nd measuring value is stored. See Diagram – 8: the meter stores automatically eight measuring values. When press M+ key, 🕘 icon stops flashing and the meter stops automatic storage. In automatic storage mode, manual storage does

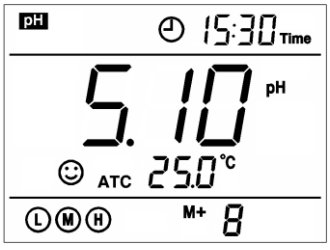


Diagram - 8

not work. Set time 0 from parameter P4.1 to exit from the automatic storage mode.

3.5.3. Recall stored value

In the measurement mode, press RM key to recall the last stored measuring value. See Diagram – 9: display **RM** icon and storage serial number. Continue pressing M+ key and RM key to recall successively the stored measuring value. Press and hold M+ key and RM key to recall quickly the stored measuring value.

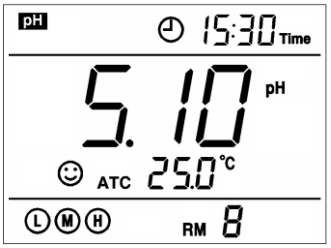


Diagram- 9

3.5.4. Clear stored value

Select **YES** from parameter P4.5 to clear all stored value, refer to the item 6.4.

4. pH measurement

4.1. pH electrode information

The meter matches 201T-Q plastic three-in-one combination pH electrode with built-in temperature sensor and has automatic temperature compensation. Electrode housing adopts polycarbonate engineering plastics which is corrosion and impact resistant. The pH socket of electrode connects BNC socket, and the temperature socket connects four-pin socket. When dip pH electrode in the solution, please stir the solution briefly to eliminate air bubbles and allow it to stay in the solution until a stable reading is reached.

4.2. pH calibration consideration

4.2.1. Standard buffer solution

The meter uses three series of standard buffer solutions: Chinese series (CH), USA series (USA) and NIST series (NIST). Please see Chart – 2. Please select the buffer solution from parameter P1.1 and refer to the item 8.3 for details.

Chart - 4 pH standard buffer solution series

Calibration guide icons		pH standard buffer solution series		
		Chinese series (CH)	USA series (USA)	NIST series (NIS)
Three-point calibration	L	1.68 pH and 4.00 pH	1.68 pH and 4.00 pH	1.68 pH and 4.01 pH
	M	6.86pH	7.00 pH	6.86pH
	H	9.18 pH	10.01 pH	9.18 pH

4.2.2. Three-point calibration

The instrument can perform 1-3 point calibration. The first point calibration must use 7.00 pH (or 6.86 pH) standard solution, then select other standard solution to perform the second and the third point

calibration, see Chart-5. During the calibration process, the instrument displays the electrode slope of acidity range and alkalinity range respectively.

Chart - 5 Calibration mode

Description	Chinese standard (CH)	USA standard (USA)	NIST standard (NIST)	Calibration guide icons	Suited range
One-point calibration	6.86 pH	7.00 pH	6.86 pH	(M)	Accuracy ⩽ ±0.1pH
Two-point calibration	6.86 pH, 4.00 pH or 1.68pH	7.00 pH, 4.00 pH or 1.68pH	6.86 pH, 4.01 pH or 1.68pH	(L) (M)	0~7.00 pH
	6.86 pH and 9.18pH	7.00 pH and 10.01pH	6.86 pH and 9.18pH	(M) (H)	7.00~14.00 pH
Three-point calibration	6.86 pH, 4.00 pH or 1.68pH and 9.18 pH	7.00 pH, 4.00 pH or 1.68pH and 10.01 pH	6.86 pH, 4.01 pH or 1.68pH and 9.18 pH	(L) (M) (H)	0~14.00 pH

4.2.3. Calibration intervals

Calibration intervals depend on the sample, the electrode performance, and the required accuracy. For high accuracy measurements (≤ ±0.02pH), the meter should be calibrated immediately before taking a measurement. For general accuracy (≥±0.1pH), the meter can be calibrated and used for approximately one week or longer before the next calibration. The meter must be recalibrated in the following situations:

(a) New probe, or probe that is unused for a long period of time

(b) After measuring acids (pH<2) or alkaline solutions (pH>12)

(c) After measuring a solution that contains fluoride or a concentrated organic solution

(d) If the solution's temperature differs greatly from the calibration solution temperature

4.2.4. Due calibration

Pre-set calibration interval (begin from the date of setup) to remind due calibration in a preset period. Please refer to parameter P1.2 (Item 8.3). When setup date comes, **Er 6** icon appears at the bottom right of LCD (see Diagram – 10). The meter can continue operation in this situation. This is just to remind the user to perform calibration to ensure measurement accuracy. **Er 6** icon disappears until the calibration is done, or when select **No** from parameter P1.2.

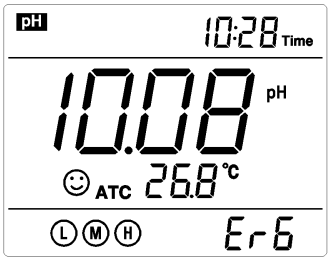


Diagram- 10

4.2.5. Check calibration date

Check the date and time of the last calibration to decide whether new calibration is needed. Please refer to parameter setting P1.3 (Item 8.3).

4.2.6 Change temperature value manually

When the temperature probe does not connect to the meter, press and hold (M+) key or (RM) key, temperature value flashes, then press (or press and hold) (M+) key or (RM) key to change the

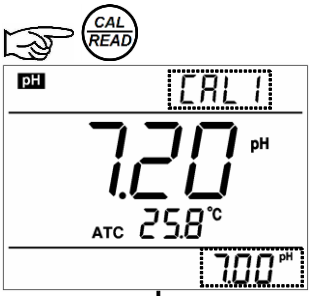
temperature value, and press key to make confirmation.

4.3. pH calibration (take an example of three-point calibration)

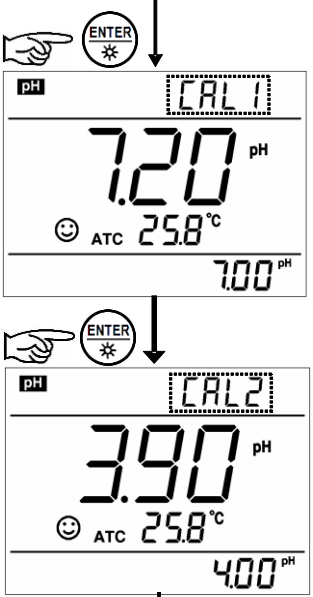
4.3.1. Press CAL/READ key to enter into the calibration mode, “CAL 1” flashes at the top right of LCD and “7.00 pH ”flashes at the bottom right of LCD, indicating using pH 7.00 buffer solution to make the 1st point calibration.

4.3.2. Rinse pH electrode in pure water, allow it to dry, and submerge it in pH7.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. The meter’s display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. **Er 2** displays if press ENTER key before the value is locked. See chart – 6.

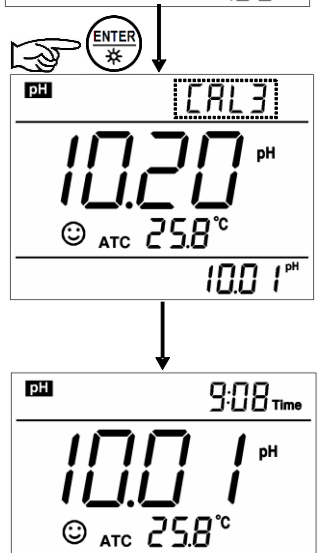
4.3.3. When the meter locks 7.00 pH, stable ☺ icon displays on LCD. Press ENTER key to calibrate the meter. **End** icon appears after calibration is done. The 1st point calibration is finished, meanwhile, the meter’s display will show at the top right a blinking CAL2, and show at the bottom right blinking 4.00pH and 10.01pH alternately, indicating using pH4.00 or pH10.01 buffer solution to make the 2nd point calibration.



4.3.4. Take out pH electrode，rinse it in pure water, allow it to dry, and submerge it in pH4.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. The meter’s display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. When the meter locks 4.00 pH, stable ☺ icon displays on LCD. Press ENTER key to calibrate the meter. End icon and electrode slope of acidity range display after calibration is done, meanwhile, the meter’s display will show at the top right a blinking CAL3, and show at the bottom right blinking 10.01pH, indicating using pH10.01 buffer solution to make the 3rd point calibration.



4.3.5. Take out pH electrode，rinse it in pure water, allow it to dry, and submerge it in pH10.01 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. The meter’s display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. When the meter locks 10.01 pH, stable ☺ icon displays on LCD. Press ENTER key to calibrate the meter. End icon and electrode slope of alkalinity range display after calibration is done. The meter returns to the measurement mode, displays stable measuring value and calibration guide icons. Please see Diagram–11 for the above calibration process.



4.3.6. During the calibration process, press key to exit from the calibration mode. The meter can perform one-point, two-point and three-point calibration. Calibration guide icons appear on LCD.

4.4. Customer-defined calibration

(take an example of 1.60pH and 6.50pH calibration solution)

Diagram- 11

4.4.1. Select **CUS** from parameter P1.1 (please refer to Item 8.3 for customer-defined solution). The meter enters into Customer-defined calibration mode. When press CAL/READ key, the meter's display show a blinking **CAL1** icon at the top right of LCD, indicating the meter enters into the 1st point customer-defined calibration.

4.4.2. Rinse pH electrode in pure water, allow it to dry, and submerge it in pH1.60 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. When LCD displays the stable measuring value and ☺ icon, press ENTER key and the measuring value flashes. Press M+ key or RM key to adjust the measuring value to 1.60, then press ENTER key to calibrate the meter. After calibration is done, LCD at the top right shows blinking CAL2 icon, indicating the meter enters into the 2nd point customer-defined calibration.

4.4.3. Rinse pH electrode in pure water, allow it to dry, and submerge it in pH 6.50 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. When LCD displays the stable measuring value and ☺ icon, press ENTER key and the measuring value flashes. Press M+ key or RM key to adjust the measurement value to 6.50, then press ENTER key to calibrate the meter. After calibration is done, the meter returns to the measurement mode. For customer-defined calibration, LCD does not show electrode calibration guide icons.

Note: For manual temperature compensation (MTC), when press ENTER key, the temperature value flashes. Press M+ key or RM key to adjust the temperature value, and then press ENTER key, pH measuring value flashes.

4.4.4. Notes

(a) The meter can perform 1-2 point customer-defined calibration. When the 1st point calibration is done, press CAL/READ key, the meter exits from calibration mode. This is one-point customer-defined calibration. When the 2nd point calibration is done, the meter returns to the measurement mode automatically.

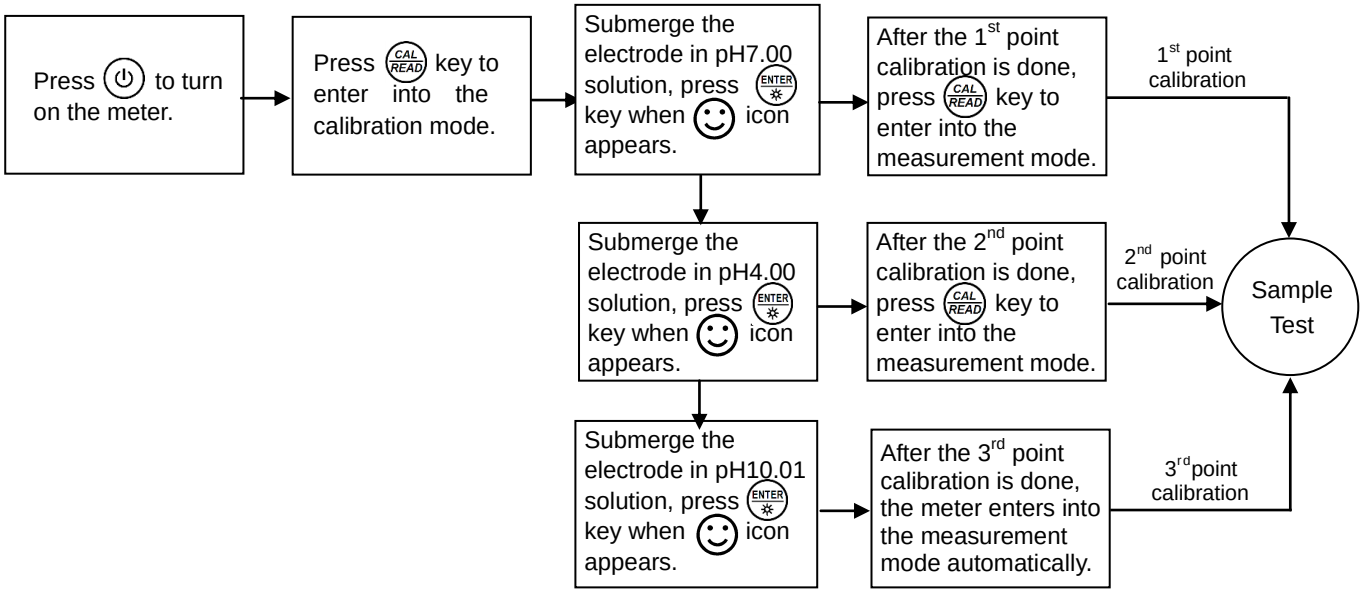
(b) The value set in "Customer-defined" is at a fixed temperature. The meter is suggested to perform calibration and measurement at the same temperature to avoid large error. The meter cannot recognize customer-defined calibration solution.

4.5. Sample test

4.5.1. Rinse pH electrode in pure water, allow it to dry, and submerge it in sample solution. Stir the solution briefly and allow it to stay in the sample solution until the stable value and ☺ icon appears on LCD, get the reading which is pH value of sample solution, please refer to Diagram-12 for calibration and

measurement process of pH meter.

Diagram – 12 Calibration and measurement process of pH meter



4.5.2. pH measurement of pure water

The meter is able to set up pH measurement mode of pure water with temperature compensation for pH value from parameter setup P1.5 (please see Item 8.3). "**PU-1**" icon displays at the right top of LCD, please refer to Diagram – 13.

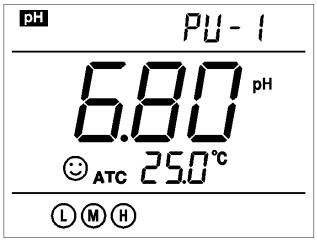


Diagram-13

4.5.3. pH measurement of pure water mixed with ammonia

The meter is able to set up pH measurement mode of pure water mixed with ammonia with temperature compensation for pH value from parameter setup P1.6 (please see Item 8.3). "**PU-2**" icon displays at the right top of LCD, please refer to Diagram – 14.

Note: In parameter setup, either "PU-1" or "PU-2" measurement mode can be selected, but both can not work at the same time.

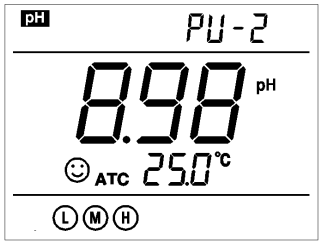


Diagram-14

4.5.4. Self-diagnosis information

During the process of calibration and measurement, the meter has self-diagnosis functions, indicating the relative information as below, please refer to chart – 6.

Chart – 6 Self-diagnosis information of pH measurement mode

Display Icons	Contents	Checking
Er 1	Wrong pH buffer solution or the buffer solution out of range.	1.Check whether pH buffer solution is correct. 2.Check whether the meter connects the electrode properly. 3.Check whether the electrode is damaged.
Er2	Press ENTER key when measuring value is not stable during calibration.	Press ENTER key when ☺ icon appears.
Er3	During calibration, the measuring value is not stable for ≥3min.	1.Check whether there are bubbles in glass bulb. 2.Replace with a new pH electrode.
Er4	pH electrode zero electric potential out of range (<-60mV or >60mV)	1.Check whether there are bubbles in glass bulb. 2.Check whether pH buffer solution is correct. 3.Replace with new pH electrode.
Er5	pH electrode slope out of range (<85% or >110%)	
Er6	Enter in pre-set due calibration to remind calibration	Press CAL READ key to perform calibration or cancel due calibration setup from parameter P1.2.

4.5.5. pH temperature principle

Please note that the closer the temperature of the sample solution to the calibration solution, the more accurate readings.

4.5.6. Factory default setting

For factory default setting, please refer to parameter P1.6 (Item 8.3). Per parameter P1.6, all calibration data is deleted and the meter restores to the theory value (zero electric potential of pH is 7.00, the slope is 100%). Some functions restore to the original value (refer to Appendix-I). When calibration or measurement fails, please restore the meter to factory default setting and then perform re-calibration or measurement. Please note once set the factory default, all the data deleted will not be retrievable.

4.6. pH electrode maintenance

4.6.1. Daily maintenance

The soaking solution contained in the supplied protective bottle is used to maintain activation in the glass bulb and junction. Loosen the capsule, remove the electrode and rinse in pure water before taking a measurement. Insert the electrode and tighten the capsule after measurements to prevent the solution from leaking. If the soak solution is turbid or moldy, replace the solution.

The electrode should not be soaked in pure water, protein solution or acid fluoride solution for long periods of time. In addition, do not soak the electrode in organic silicon lipids.

For best accuracy, always keep the meter clean and dry, especially the meter's electrode and electrode socket. Clean with medical cotton and alcohol if necessary.

4.6.2. Calibration buffer solution

For calibration accuracy, the pH of the standard buffer solution must be reliable. The buffer solution should be refreshed often, especially after heavy use.

4.6.3. Protect glass bulb

The sensitive glass bulb at the front of the combination electrode should not come in contact with hard surfaces. Scratches or cracks on the electrode will cause inaccurate readings. Before and after each measurement, wash the electrode with pure water and then throw off the excess water on the electrode. Do not clean the glass bulb with a tissue for it will affect the stability of the electrode potential and increase the response time. The electrode should be thoroughly cleaned if a sample sticks to the electrode. Use a solvent if the solution does not appear clean after washing.

4.6.4. Renew glass bulb

Electrodes that have been used over a long period of time, will become ageing. Submerge the electrode in 0.1mol/L hydrochloric acid for 24 hours, then wash the electrode in pure water, then submerge it in soaking solution for 24 hours. The method to prepare 0.1mol/L hydrochloric acid: dilute 9mL hydrochloric acid in pure water to 1000mL. For serious passivation, submerge the bulb in 4% HF (hydrofluoric acid) for 3-5 seconds, and wash it in pure water, then submerge it in the soaking solution for 24 hours to renew it.)

4.6.5. Clean contaminated glass bulb and junction (see Chart – 7)

Chart – 7 Clean contaminated glass bulb and junction

Contamination	Abluent
Inorganic metal oxide	Dilute 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)
Paint	Dilute bleacher, peroxide

Note: The electrode housing is polycarbonate. When use abluent, take cautions on carbon tetrachloride, trichlorethylene, tetrahydrofuran, acetone, etc which will dissolve the housing and invalidate the electrode.

5. mV measurement:

5.1. ORP measurement

Press MODE key, and switch the meter to mV measurement mode. Connect ORP electrode (need purchase it separately) and dip it in sample solution, stir the solution briefly and allow it to stay in the solution until ☺ icon appears and get the reading which is ORP value.

ORP means Oxidation Reduction Potential. The unit is mV.

5.2. Notes of ORP measurement

5.2.1. ORP measurement does not require calibration. When the user is not sure about ORP electrode quality or measuring value, use ORP standard solution to test mV value and see whether ORP electrode or meter works properly.

5.2.2. Clean and activate ORP electrode

After the electrode has been used over a long period of time, the platinum surface will get polluted which causes inaccurate measurement and slow response. Please refer to the following methods to clean and activate ORP electrode:

(a) For inorganic pollutant, submerge the electrode in 0.1mol/L dilute hydrochloric acid for 30 minutes, then wash it in pure water, then submerge it in the soaking solution for 6 hours.

(b) For organic or lipid pollutant, clean the platinum surface with detergent, then wash it in pure water, then submerge it in the soaking solution for 6 hours.

(c) For heavily polluted platinum surface on which there is oxidation film, polish the platinum surface with toothpaste, then wash it in pure water, then submerge it in the soaking solution for 6 hours.

6. Conductivity Measurement:

6.1. Conductivity electrode information

6.1.1. Conductivity electrode

Model 2301T-Q plastic conductivity electrode with constant K=1.0 and built-in temperature sensor has automatic temperature compensation. The electrode housing is polycarbonate plastic which is corrosion resistant and impact resistant. When submerge the conductivity electrode in solution, stir the solution briefly to eliminate air bubbles and improve response and stability.

6.1.2. Conductivity electrode constant

The meter matches conductivity electrodes of three constants: K=0.1, K=1.0 and K=10.0. Please refer to Chart-8 for measuring range. Set constant from parameter P2.2 and refer to Item 8.4.

Chart – 8 Electrode constant and measuring range

Range	< 20 μS/cm	0.5μS/cm~100mS/cm			＞100mS/cm
Conductivity electrode constant	K=0.1 cm^{-1}	K=1.0 cm^{-1}			K=10 cm^{-1}
Standard solution	146.6μS/cm	146.6μS/cm	1408 μS/cm	12.85 mS/cm	111.3 mS/cm
Electrode model	DJS-0.1-Q	2301T-Q			2310T-Q

Notes: For high purity water with conductivity <1.0 μS/cm, please use flow cell to test moving water.

6.1.3. Connect conductivity electrode

The electrode has four-pin socket, connects the four-pin socket of the meter at the left side. When connect the conductivity electrode socket to the meter socket, please fit it slowly, do not pull the cable forcefully. Keep the socket clean and dry. Please refer to Item 6.7 “Conductivity electrode maintenance” for details.

6.2. Conductivity calibration consideration

6.2.1. Conductivity calibration solutions

The meter uses two series of conductivity standard solution: Chinese series (CH) and USA series (USA), and also customer-defined solution (CUS). Select the standard solution from parameter P2.2 (refer to

Item 8.4). The meter can recognize the standard solution automatically; can perform one-point or multi-point calibration (four-point calibration at maximum). The calibration guide icons at the bottom left of LCD correspond to the four standard values. See Chart – 9:

Chart – 9 Conductivity standard solution series

Calibration guide icons	Calibration solution series		Range
	Chinese standard (CH)	USA standard (USA)	
L	146.6 μS/cm	84 μS/cm	0-200 μS/cm
M	1408 μS/cm	1413 μS/cm	200-2,000 μS/cm
H	12.85 mS/cm	12.88 mS/cm	2-20 mS/cm
	111.3 mS/cm	111.9 mS/cm	20-200 mS/cm

6.2.2. Calibration intervals

(a) The meter is calibrated before leaving the factory and can generally be used right out of the box.

(b) Normally perform calibration per month.

(c) For high accuracy measurements or large temperature deviation from the reference temperature (25°C), perform calibration per week.

(d) Use conductivity standard solution to check whether there is error. Perform calibration for large error.

(e) For new electrode or factory default setting, perform three-point or four-point calibration. Choose closer standard solution to the sample solution to perform one- point or two-point calibration. For example: 1413 μS/cm standard solution is suited for range 0-2,000 μS/cm.

6.2.3. One-point and multi-point calibration

For one-point calibration after three-point or four-point calibration, the previous calibration value in the same range will be replaced, meanwhile, the meter will show the calibration guide icon of this point, other two calibration guide icons will be deleted, but the chip will reserve the last calibration data. After the meter restores to factory default setting, all the calibration data is deleted and the meter restores to theory value. When choose multi-point calibration, perform calibration from low to high concentration to avoid standard solution of low concentration being contaminated.

6.2.4. Reference temperature

Reference temperature of factory default is 25°C. Other reference temperature within the range 15°C – 30°C can also be set from parameter P2.5 and please refer to Item 8.4.

6.2.5. Temperature coefficient

The temperature compensation coefficient of the factory default setting is 2.0%. However, the conductivity temperature coefficient is different for solutions of a different variety and concentration. Please refer to Chart – 10 and the data collected during testing. Set the coefficient from parameter P2.6 and refer to Item 8.4. For high purity water of less than 10μS/cm, the meter has automatic non-linear

temperature compensation.

Note: When the coefficient for the temperature compensation is set 0.00 (no compensation), the measurment value will be based on the current temperature.

Chart-10 Temperature compensation coefficient of special solutions

Solution	Temperature compensation coefficient
NaCl salt solution	2.12%/°C
5%NaOH solution	1.72%/°C
Dilute ammonia solution	1.88%/°C
10% hydrochloric acid solution	1.32%/°C
5% sulfuric acid solution	0.96%/°C

6.2.6. Avoid contamination of standard solution

Conductivity standard solution has no buffer. Please avoid being contaminated during usage. Submerge the electrode in standard solution before wash the electrode and allow it dry. Please renew conductivity standard solution frequently especially for standard solution of low concentration 146.6μS/cm or 84μS/cm. The contaminated standard solution can affect accuracy.

6.2.7. Due calibration

Pre-set calibration interval (begin from the date of last calibration) to remind calibration in preset interval from parameter P2.3 (Item 8.4). When due calibration time comes, **Er 6** icon appears at the bottom right of LCD (see Diagram – 15). The meter can continue operation in this situation. This is just to remind the user to perform calibration to ensure measurement accuracy. **Er 6** icon disappears until the calibration is done, or when select **No** from parameter P2.3.

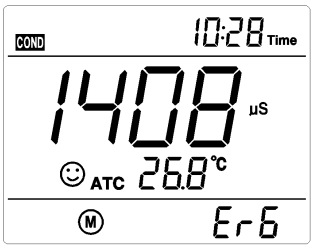


Diagram- 15

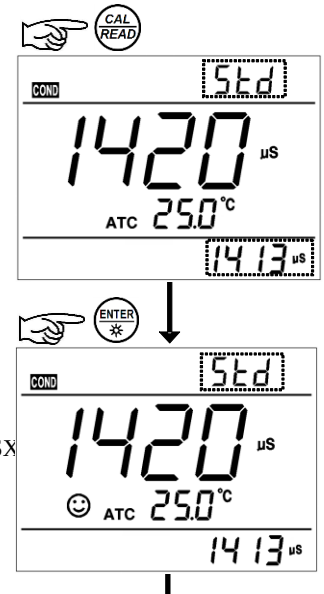
6.2.8. Check the calibration date

Check the last calibration date to see whether a new calibration is needed from parameter P2.4. (Item 8.4)

6.3. Conductivity calibration (take an example of calibration with 1413μS/cm)

6.3.1. Rinse pH electrode in pure water, allow it to dry, and then rinse it in the standard solution. When submerge it in the standard solution, stir the solution briefly and allow it to stay in the solution until a stable reading is reached.

6.3.2. Press CAL/READ key to enter into the calibration mode. The meter's display will show blinking **CAL** at the top right, and scanning and locking process of ENTER



calibration solution at the bottom right. **Er 2** appears if press key before the value is locked. Please refer to Chart – 12.

6.3.3. When the meter locks 1413 μS, ☺ icon displays on LCD. Press ENTER key to calibrate the meter. **End** icon appears after calibration is done. The meter returns to the measurement mode and LCD shows M icon at the bottom left. Please refer to Diagram – 16 for calibration process.

6.3.4. If exit from calibration mode without calibration, press CAL READ key to return to the measurement mode without calibration.

Diagram- 16

6.3.5. For multi-point calibration, please repeat Item 6.3.1-6.3.3 until all the calibration is done. The meter can repeat calibration in the same calibration solution to ensure better accuracy and repeatability of the reading.

6.4. Relations among TDS, salinity, resistivity and conductivity

6.4.1. TDS and conductivity is linear related, the conversion factor is 0.40-1.00. Adjust the factor from parameter P2.7. The factory default setting is 0.71 and please refer to Item 8.4. Salinity and conductivity are interrelated, and the same to resistivity and conductivity. The meter only needs to be calibrated in Conductivity mode, then after calibration of conductivity, the meter can switch from conductivity to TDS, salinity or resisitivity mode.

6.4.2. Adjust TDS conversion factor from parameter P2.7 according to the data collected during testing. Please refer to Chart – 11: Conductivity and TDS conversion factors frequently used.

Chart – 11 Conductivity and TDS conversion factors

Conductivity of solution	TDS conversion factor
0-100 μS/cm	0.60
100-1,000 μS/cm	0.71
1-10 mS/cm	0.81
10-100 mS/cm	0.94

6.5. Customer-defined calibration (take an example of 10.50μS/cm standard solution)

6.5.1.Select **CUS** from parameter P2.2 (please refer to Item 8.4 for customer-defined solution). The meter enters into Customer-defined calibration mode. When press CAL READ key, LCD shows blinking **CAL** at the top right, indicating that the meter enters into customer-defined calibration.

6.5.2. Rinse the electrode in pure water, allow it to dry, and submerge it in 10.50 μS/cm standard solution. Stir the solution briefly and allow it to stay in the solution until a stable reading is reac☺ and icon appears on LCD.

6.5.3. When press key, the measuring value flashes, **CUS** icon appears at the right top of LCD. Press M+ key or RM key to adjust the measuring value to 10.50μS/cm, then press ENTER key to calibrate the meter. After the calibration is done, the meter displays **End** icon and returns to the measurement mode. In conductivity measurement mode with customer-defined calibration, the meter does not display electrode calibration guide icon.

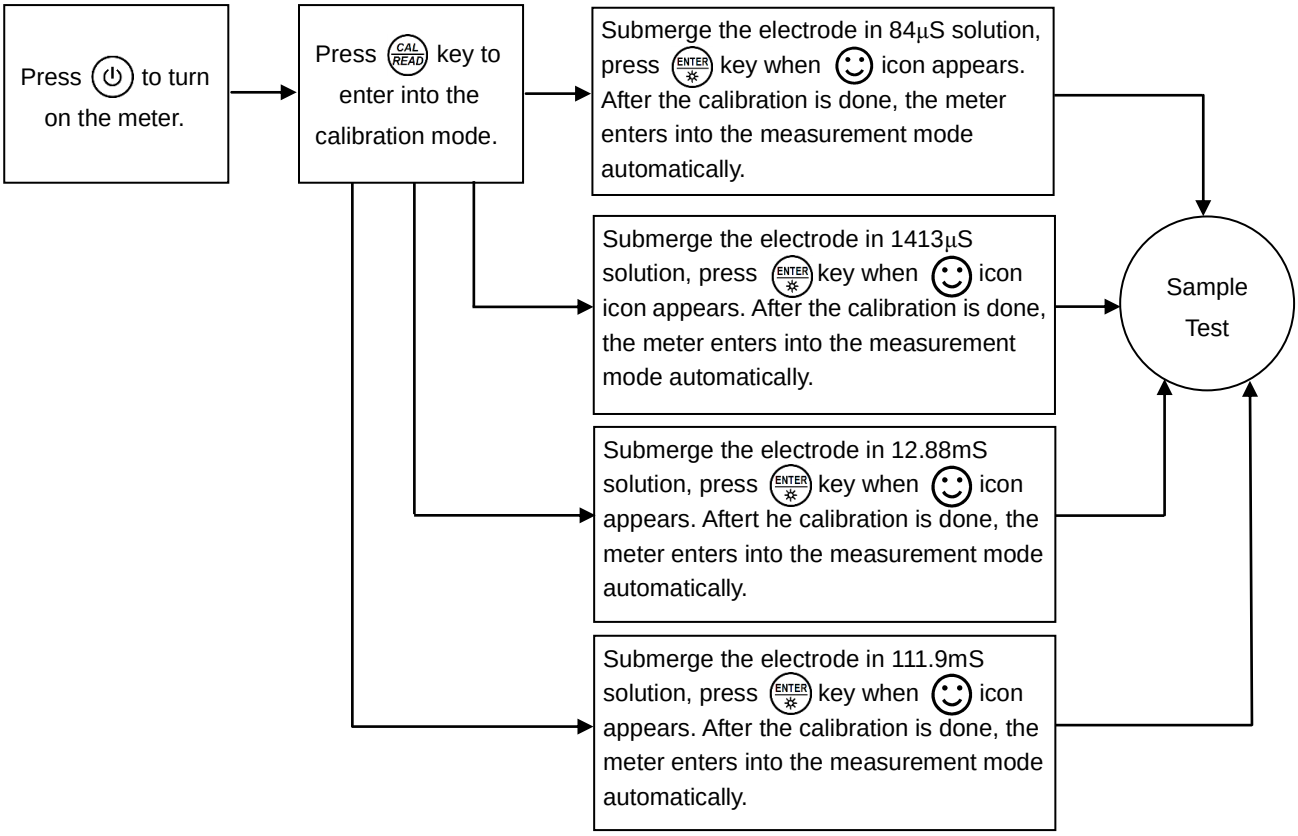
Note: If use the conductivity electrode without temperature sensor (manual temperature compensation (MTC)), when press ENTER key, the temperature value flashes. Press M+ key or RM key to adjust the temperature value, and press ENTER key, then the conductivity value flashes.

6.5.4. Only one-point calibration for customer-defined calibration. The value set in “Customer-defined” is at a fixed temperature. There is no regulation of temperature coefficient and reference temperature. The meter is suggested to perform calibration and measurement at the same temperature to avoid large error. The meter cannot recognize customer-defined calibration solution.

6.6. Sample test

6.6.1. Rinse conductivity electrode in pure water, allow it to dry, and submerge it in the sample solution. Stir the solution briefly and allow it to stay in the sample solution until a stable reading is reached and ☺ icon appears on LCD, then get the reading value which is the conductivity value of the solution, please refer to Diagram – 17.

Diagram -17 Calibration and measurement process of conductivity meter



6.6.2. Press and hold ENTER key to scroll through TDS, salinity, resistivity and conductivity measuring value.

6.6.3. During the process of calibration and measurement, the meter has self-diagnosis functions, indicating the relative information, please refer to Chart – 12.

Chart – 12 Self-diagnosis information of conductivity measurement mode

Display Icons	Contents	Checking
Er 1	Wrong conductivity calibration solution or the calibration solution out of range	1. Check whether conductivity calibration solution is correct. 2. Check whether the meter connects the electrode properly. 3. Check whether the electrode is damaged.
Er2	Press ENTER key when measuring value is not stable during calibration.	Press ENTER key when ☺ icon appears
Er3	During calibration, the measuring value is not stable for ≥3min.	1. Shake the electrode to eliminate bubbles in electrode head. 2. Replace with a new pH electrode.
Er6	Enter in pre-set due calibration to remind calibration	Press CAL READ key to perform calibration or cancel due calibration setup from parameter P2.3.

6.6.4. Factory default settings

For factory default setting, please refer to parameter P2.8 (Item 8.4). All calibration data is deleted and the meter restores to the theory value. Some functions restore to the original value (refer to Appendix - I). For any display abnormalities while measuring or calibrating, set the meter to its factory default settings and then perform re-calibration or measurement. Please note once set the factory default, all the data deleted will not be retrievable.

6.7. Conductivity electrode maintenance

6.7.1. Always keep the conductivity electrode clean. Before taking a measurement, rinse the electrode in pure water and then rinse it in the sample solution. When submerge the electrode in the solution, stir the solution briefly to eliminate air bubbles and allow it to stay until a stable reading is reached. For conductivity electrode which keeps dry, soak the electrode in pure water for 5-10 minutes before taking a measurement. Rinse the electrode in pure water after measurement.

6.7.2. The surface of the conductivity electrode Model 2301T-Q is plated with a layer of platinum (black) in order to lower the electrode polarization and increase the measuring range. Do not polish the black platinum surface; clean it by stirring in pure water. If excessive organic buildup appears on the black platinum coating, clean with lukewarm water containing detergent or with alcohol.

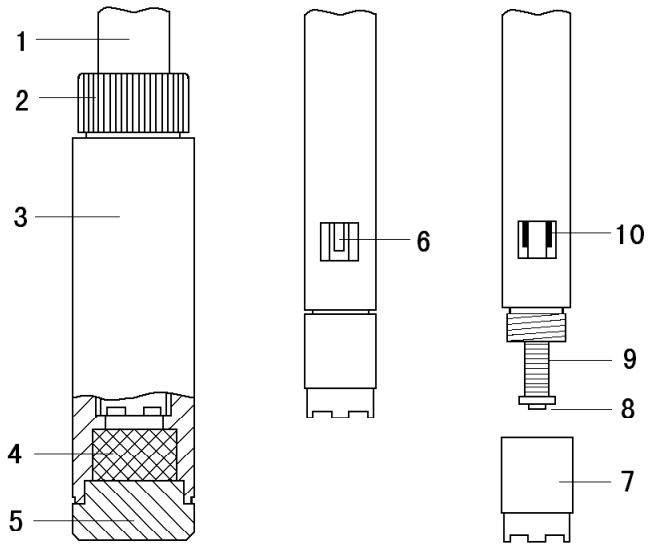
6.7.3. If the electrode plated with platinum black is invalid, immerse it in 10% nitric acid solution or 10% hydrochloric acid solution for 2 minutes, then rinse the electrode in pure water. If the electrode still does not work, replace with a new conductivity electrode.

7. DO (Dissolved Oxygen) Measurement

7.1. DO (Dissolved Oxygen) electrode information

7.1.1. DO electrode structure

The meter matches model DO500 DO electrode with built-in temperature sensor and salinity sensor and has automatic temperature compensation and automatic salinity compensation functions. Please refer to the DO electrode structure: Chart – 18.



1 — DO electrode
2 — Calibration cover cap
3 — Calibration cover
4 — Water soaked sponge
5 — Calibration cover bottom
6 — Temperature sensor
7 — Membrane cap
8 — Cathode (gold)
9 — Anode
10 — Salinity sensor

Diagram – 18

7.1.2. Keep the DO electrode moist

Keep the surface of the DO electrode moist to protect the cathode electrolyte. Once the sponge (refer to Diagram-18) is dry, add a little of pure water to the sponge but do not allow excess water in the bottle, and tightly secure the calibration cover cap. The supplied storage sponge should always be kept moistened for proper storage.

7.1.3. Clean the salinity electrode

The salinity electrode is installed in the DO electrode (refer to Diagram-18). Its surface is plated with a

layer of platinum black to lower electrode polarization. This surface must not be rubbed or wiped but should be cleaned by swirling it in water. Wash organic matter off the surface with lukewarm water containing detergent or use alcohol if necessary.

7.1. 4. Replace with membrane

When the DO electrode response is too slow, the measuring value is deviated obviously, or there is cracks on membrane of DO electrode, please replace with a membrane according to the following steps:

(a) Remove the membrane cap,

(b) Wash the DO electrode without the membrane cap in pure water, and shake off the excess water on the electrode,

(c) Clean the surface of cathode (gold) with clean lint cloth or tissue paper,

(d) Inject electrolyte slowly in a new membrane cap, do not allow air bubbles, tap the membrane cap shell by finger to eliminate any air bubbles,

(e) Place the membrane cap on the table, attach the DO electrode vertically to the membrane, screw it by clockwise until it is tightly fit, remove the excess electrolyte with tissue paper, wash the DO electrode in pure water,

(f) Check whether there are air bubbles in the electrolyte. Small air bubbles are acceptable in the electrode but larger air bubbles should not be allowed. Otherwise, remove the membrane cap again to re-add the electrolyte,

(g) When use the electrode or replace with a new membrane cap, do not touch the membrane by hands since sweat or lipid on hands affects the membrane quality and lowers oxygen permeability.

7.1.5. Connect the electrode to the meter

When connect the electrode to the meter, please fit the socket by screwing slowing, and then tightly secure it. Please do not pull the electrode cable forcefully, ensure proper contact, keep the socket clean and dry.

7.2. DO (Dissolved Oxygen) calibration consideration

7.2.1. Air calibration

The meter is only suited for air calibration with calibration cover. During calibration, the air temperature and sample water temperature should be close (≤10℃) , if the temperature difference is greater, please immerse the electrode in the sample water for 10 minutes and then place the DO electrode in the calibration cover for 5-6min, and then perform calibration.

7.2.2. Do not turn off the meter during operation

After each start-up, the electrode must be polarized and a calibration must be performed; do not turn the meter off (when in the DO mode, the default auto power off time is zero).

7.3. DO (Dissolved oxygen) calibration

7.3.1. Dissolved oxygen calibration steps

(a) Press (⏻) key to turn on the meter, connect DO500 DO electrode to the meter,

(b) Press and hold (ENTER) key to select the desired unit of measure (mg/L, ppm, %); then release,

(c) Put the DO electrode into the calibration cover and tightly secure the cap of the calibration cover, and allow polarizing for 3 to 5 minutes until the reading is stable,

(d) Press (CAL READ) key to enter in the calibration mode, the flashing CAL icon will appear at the top right of LCD. When the reading stabilizes, the smiley face icon ☺ appears on the LCD, press (ENTER) key to perform calibration. After a few seconds, the calibration is done and the meter returns to the measurement mode. If the displayed reading does not stabilize, after a few minutes, retry this calibration procedure until the reading is stable.

Note: the measurement principle of the polarographic DO electrode is that oxygen reacts in the cathode and generates a current through the electrode membrane. Under the same conditions, the measured value of the dissolved oxygen electrode in air is greater than that in water. The program set in this instrument in accordance with the characteristics of the DO500 dissolved oxygen electrode defines the instrument display value in the air 110%, therefore when the electrode is carried out with air calibration in the calibration cover, the dissolved oxygen saturation is 110%, and the dissolved oxygen concentration is 9.07mg / l (25 ° C). When the electrode is tested in water, dissolved oxygen saturation is 100%, and the dissolved oxygen concentration is 8.25mg / l (25 ° C), the measured value of the instruments in the air is 10% greater than that in water, therefore, the instrument only applies to air calibration in calibration cover and measurement of dissolved oxygen in water.

7.3.2. Zero oxygen calibration

Zero oxygen calibration is done by factory before delivery, so no need zero oxygen calibration during initial use. Only make zero oxygen calibration when replace with a new DO electrode or a new membrane cap, or when the electrode is unused for long time. Make zero oxygen calibration according to the following steps:

(a) Prepare 100mL anaerobic water: in 100 mL beaker, add 5g anhydrous sodium sulfite (Na_2SO_3), add 100 mL pure water, stir Na_2SO_3 until dissolved, anaerobic water is effective within 24 hours,

(b) Connect the electrode to the meter and wait for 5min, and perform calibration according to Item 7.3.1,

(c) Place the electrode in the anaerobic water, press (CAL READ) key to enter in calibration mode, wait for about 5 min, when reading value is ≤ 0.15mg/L, press (ENTER) key to calibrate, calibration is done after a few seconds, the meter displays 0.00 mg/L, rinse the electrode in pure water,

(d) If the reading value ≤0.02mg/L within 5 minutes, the meter's response time and zero error meet the requirement,no need zero oxygen calibration,press (CAL READ) key to return to the measurement mode.

(e) The reading value >0.15 mg/L after 5 minutes means slow response and big zero error of the meter. In this case, replace with a new membrane cap, or remove the membrane cap, wipe slightly the cathode gold surface with polishing paper (in the kit), and then clean the surface of cathode with lint cloth or tissue paper, rinse the electrode in pure water and shake off the excess water on the electrode. Add some electrolyte into the membrane cap, secure the membrane cap tightly, then

perform full scale and zero oxygen calibration according to the item 7.3.1 and 7.3.2.

7.3.3. Salinity Calibration:

The meter has an automatic salinity compensation function, so salinity calibration is required. Since salinity calibration is done by factory before delivery, so no need salinity calibration during initial use. Only make salinity calibration when replace with a new electrode, or when the electrode is unused for long time. Make salinity oxygen calibration according to the following steps:

(a) Switch the meter to parameter setup P3.2,

(b) Press ENTER key to enter in the salinity calibration mode, the measuring value is flashing at the right bottom of LCD. ***Note: use 12.85mS/cm conductivity calibration solution to calibrate salinity.*** If the electrode is not connected properly or the standard solution is wrong, Er 1 icon is flashing at the right bottom of LCD.

(c) Submerge the DO electrode in 12.88mS/cm conductivity calibration solution, stir the solution briefly and allow it to stay in the calibration solution for a while. When the reading is stable, press ENTER key to calibrate, salinity calibration is finished, LCD displays correct salinity value (refer to Diagram – 19). Press CAL/READ key to return to the measurement mode.

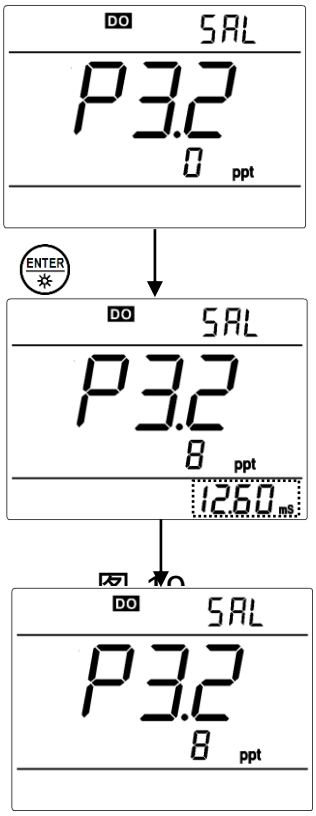


Diagram-19

7.3.4. Adjust barometric pressure value:

The meter has manual barometric pressure compensation function. When barometric pressure varies greatly during measurement, recommend to reset the value according to the standard barometric pressure value or various altitudes (refer to the Chart IV and VI) to ensure the barometric pressure compensation accuracy. Adjust barometric pressure from parameter setup P3.3.

7.4. Sample Test

7.4.1. Measurement in lab.

Use stirrer to make measurement: pour sample solution in a larger beaker, place the electrode in the electrode holder, turn on the stirrer and begin measurement. Select suitable stir speed, balance the oxygen DO electrode consumes and the oxygen the solution absorbs during stirring, slowly adjust the stir speed repeatedly until the measuring value is stable.

7.4.2. Measurement in field

(a) To measure flowing water (water sample velocity of flow >5cm/s): Insert the DO electrode into the water. The water surface should cover the electrode's thermistor (temperature sensor). The recommended electrode orientation with regard to the water is a 45°to 75°angle. Move the electrode gently around in the water and allow 3 to 5 minutes to take the reading.

(b) To measure in static slower flowing water: Insert the DO electrode into water, water surface should cover the electrode's thermistor (temperature sensor), the orientation for the electrode with regard to

the water is a 45°to 75°angle. Quickly stir the electrode in water at a speed >5cm/s and allow 3 to 5 minutes to take the reading.

7.4.3. Notes:

(a) When measuring, remove air bubbles from the solution under test. Larger bubbles in the electrode's electrolyte are also not allowed (small air bubbles are acceptable). Otherwise measurement accuracy will be compromised. In case larger bubbles in electrolyte occur, take off the membrane cap, add electrolyte to the membrane and take on the membrane cap.

(b) During DO tests, the temperature affects the measurement greatly. The electrode's thermistor comes in direct contact with the water sample. Please allow 3 to 5 minutes for the thermistor to gage a stable temperature measurement, the same as that the electrode's electrolyte reaches. Normally it takes >3min to take a reading. Especially when the electrode temperature differs from the water sample temperature greatly, it requires longer time to take a reading.

7.4.4. Self-diagnosis information

During the process of calibration and measurement, the meter has self-diagnosis functions, indicating the relative information as below, please refer to Chart – 13.

Chart – 13 Self-diagnosis information of DO measurement mode

Display Icons	Contents	Checking
Er 1	Wrong calibration solution for salinity calibration or the calibration solution out of range.	1. Check whether calibration solution is correct. 2. Check whether the meter connects the electrode properly. 3. Check whether the electrode is damaged.
Er2	Press ENTER key when measuring value is not stable during calibration.	Press ENTER key when ☺ icon appears

7.4.5. Factory default setting

For any display abnormalities while measuring or calibrating, set the meter to its factory default settings from parameter P3.4 (Item 8.5), and then perform re-calibration or measurement. When set the meter to its factory default settings, all calibration data is deleted and the meter restores to the theory value. Some functions restore to the original value (refer to Appendix - I). Please note once set the factory default, all the data deleted will not be retrievable.

8. Parameter setup

8.1. Main menu

In the measurement mode, press and hold MODE key to enter in mode P1.0, then press M+ or RM to switch among main menu: P1.0→P2.0→P3.0→P4.0. Please refer to chart – 20.

P1.0: pH parameter setup menu,

P2.0: Conductivity parameter setup menu,

P3.0: Dissolved oxygen (DO) parameter setup menu,

P4.0: Basic parameter setup menu.

8.2. Submenu

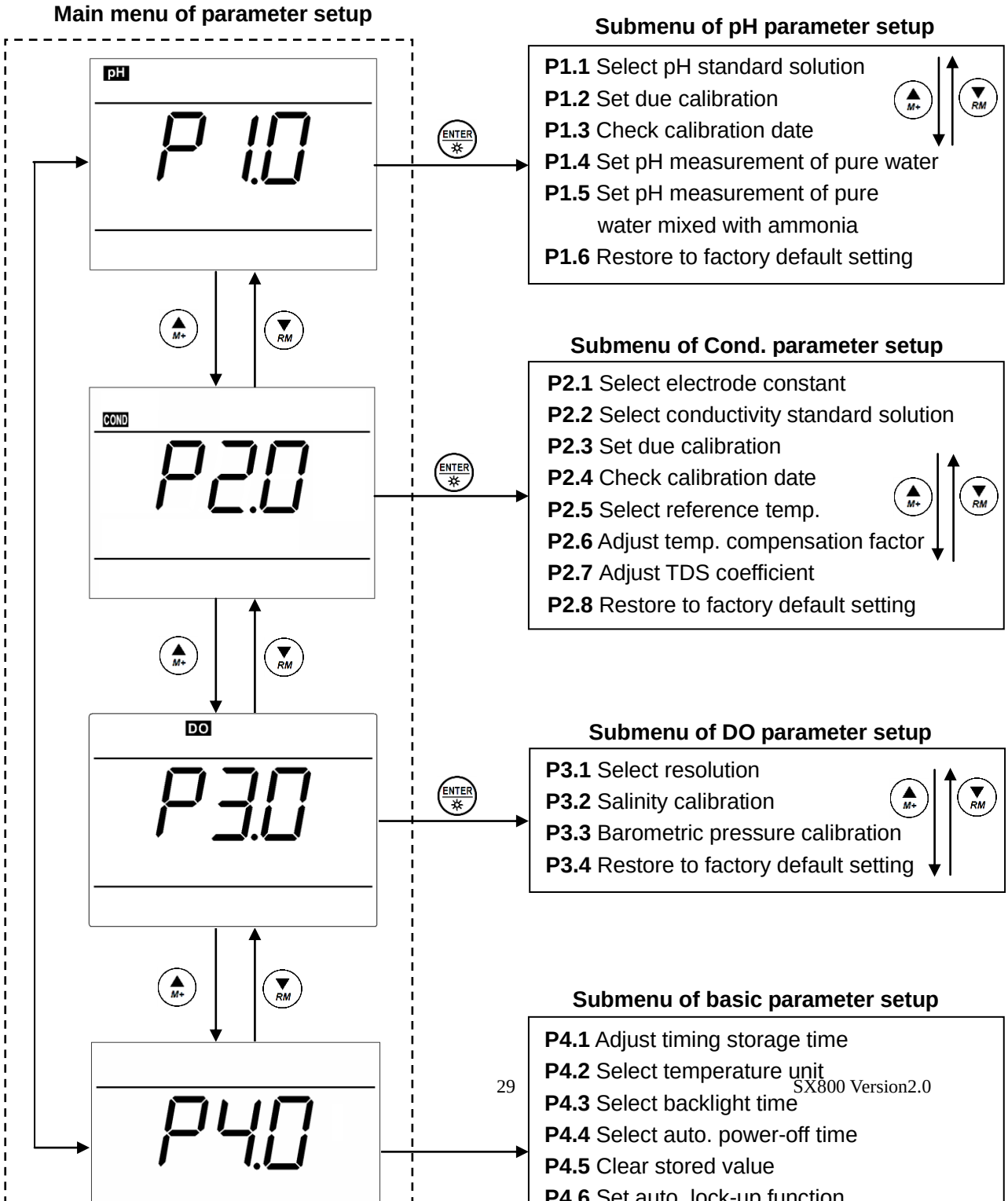
8.2.1. In P1.0 mode, press ENTER key to enter in submenu P1.1 of pH parameter setup, then press M+ and RM key to switch among submenu: P1.1→P1.2→…→P1.6, refer to chart – 20.

8.2.2. In P2.0 mode, press ENTER key to enter in submenu P2.1 of conductivity parameter setup, then press M+ and RM key to switch among submenu: P2.1→P2.2→…→P2.8, refer to chart – 20.

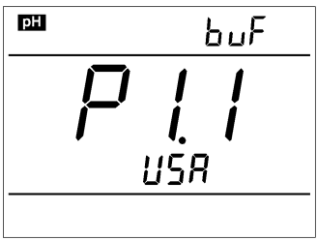
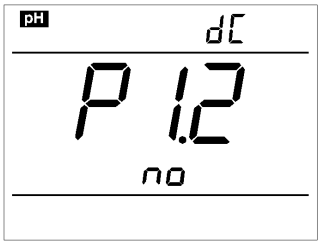
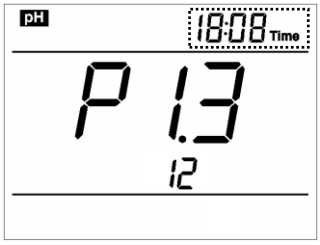
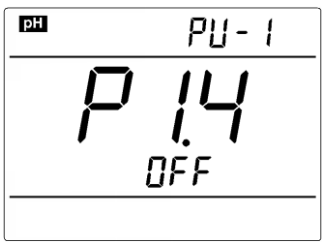
8.2.3. In P3.0 mode, press ENTER key to enter in submenu P3.1 of DO parameter setup, then press M+ and RM key to switch among submenu: P3.1→P3.2→P3.3→P3.4, refer to chart – 20.

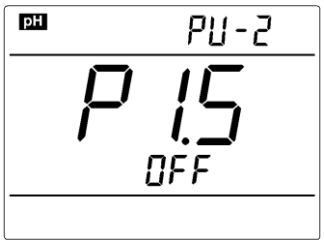
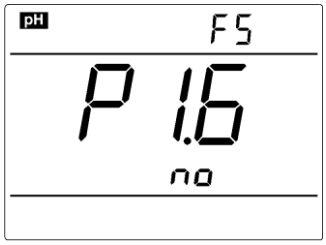
8.2.4. In P4.0 mode, press ENTER key to enter in submenu P4.1 of basic parameter setup, then press M+ and RM key to switch among submenu: P4.1→P4.2→…→P4.8, refer to chart – 20.

Diagram – 20 Main menu and submenu of parameter setup

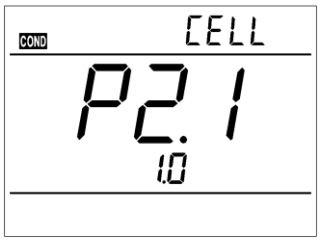
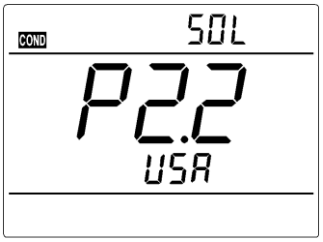
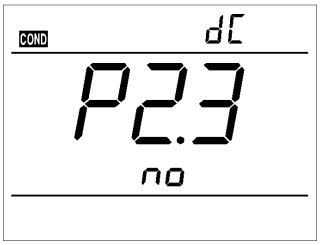
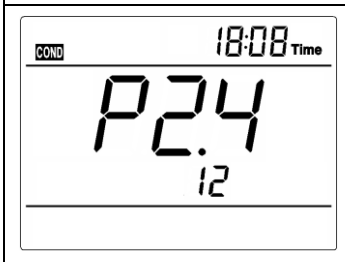


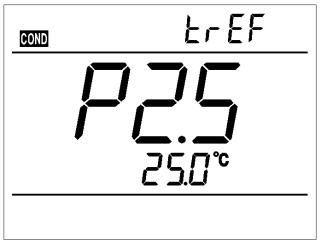
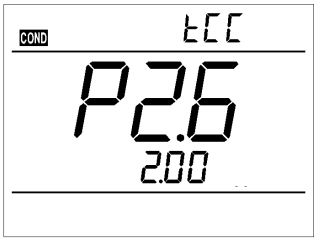
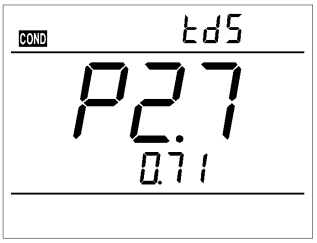
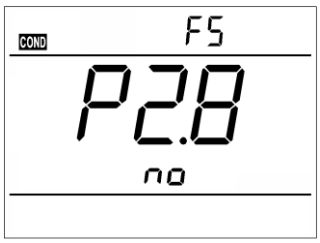
8.3. Submenu of pH parameter setup (press M+ or RM key to switch)

	**P1.1. – Select pH standard solution (USA-NIST-CUS-CH)** 1. In P1.0 mode, press ENTER to enter in P1.1 mode, refer to the left diagram. 2. When press ENTER key,**USA** flashes,then press M+ key, **NIST** flashes,etc. When parameter flashes, press ENTER to make confirmation(USA – USA series, NIS–NIST series, CUS–customer-defined, CH–Chinese series) 3. Press M+ key to enter in P1.2 mode, or press CAL/READ key to return to the measurement mode.
	**P1.2. – Set due calibration (NO – H00 – D00)** 1. When press ENTER key, **No** flashes, then press M+ key, **H** flashes, then press M+ key, **D** flashes. 2. When **H** flashes, press ENTER key, **00** flashes. Press M+ key to adjust hours (0-99 hours), press ENTER key to confirm. When **D** flashes, press ENTER key, **00** flashes. Press M+ key to adjust days (0-99 days), press ENTER key to confirm. When **No** flashes, press ENTER to confirm. 3. After confirm parameter, press M+ key to enter in P1.3 mode, or press CAL/READ key to return to the measurement mode.
	**P1.3. – Check the time and date of the last calibration** 1. The time and date of calibration displays alternately at right top of LCD (Date display: Month – Day), the number in the LCD middle displays Year (Year 2012). 2. Press M+ key to enter in P1.4 mode, or press CAL/READ key to return to the measurement mode.
	**P1.4. – Set pH measurement of pure water (Off – On)** 1. Press ENTER key, **Off** flashes, then press M+ key, **On** flashes, when parameter flashes, press ENTER key to confirm. **Off**–turn off temperature compensation, **On** – turn on temperature compensation. 2. After confirm parameter, press M+ key to enter in P1.5 mode, or press CAL/READ key to return to the measurement mode.

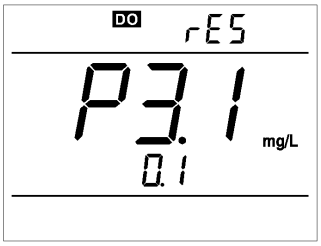
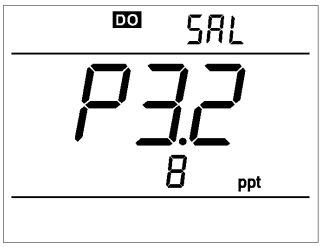
	**P1.5. – Set pH measurement of pure water with ammonia (Off – On)** 1. Press (ENTER) key, **Off** flashes, then press (M+) key, **On** flashes, when parameter flashes, press (ENTER) key to confirm. **Off**–turn off temperature compensation, **On**–turn on temperature compensation. 2. After confirm parameter, press (M+) key to enter in P1.6 mode, press (CAL/READ) key to return to the measurement mode.
	**P1.6. – Restore to factory default setting (NO – Yes)** 1. Press (ENTER) key, **No** flashes, then press (M+) key, **Yes** flashes. Press (ENTER) key to confirm, the meter returns to the measurement mode. **No** – Not restore to factory default setting, **Yes** – restore to factory default setting. 2. When do not select **Yes**, press (CAL/READ) key to return to the measurement mode.

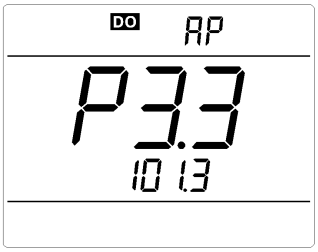
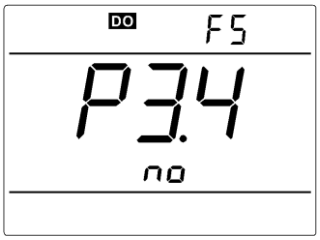
8.4. Submenu of Cond. parameter setup (press (M+) key or (RM) key to switch)

	**P2.1. – Select electrode constant (1.0-10.0-0.1)** 1. In P2.0 mode, press (ENTER) key to enter in P2.1 mode, please refer to the left diagram. 2. Press (ENTER) key, 1.0 flashes, then press (M+) key, 10.0 flashes, then press (M+) key, 0.1 flashes, when parameter flashes, press (ENTER) key to confirm. 3. After confirm the parameter, press (M+) key to enter in P2.2 mode, or press (CAL/READ) key to return to the measurement mode.
	**P2.2. – Select conductivity standard solution (USA-CUS-CH)** 1. Press (ENTER) key, **USA** flashes, then press (M+) key, **CUS** flashes. When parameter flashes, press (ENTER) key to confirm. **USA** – USA series, **CUS** – customer defined solution, **CH** – Chinese series. 2. After confirm the parameter, press (M+) key to enter in P2.3 mode, or press (CAL/READ) key to return to the measurement mode.
	**P2.3. – Set due calibration (No – H00 – D00)** 1. Press (ENTER) key, **No** flashes, then press (M+) key, **H** flashes, then press (M+) key, **D** flashes. 2. When **H** flashes, press (ENTER) key, **00** flashes. Press (M+) key to adjust hours (0-99 hours), press (ENTER) key to confirm. When **D** flashes, press (ENTER) key, **00** flashes. Press (M+) key to adjust days (0-99 days), press (ENTER) key to confirm. When **No** flashes, press (ENTER) to confirm. 3. After confirm parameter, press (M+) key to enter in P2.4 mode, or press (CAL/READ) key to return to the measurement mode.
	**P2.4. – Check the date and time of the last calibration** 1. The time and date of calibration displays alternately at right top of LCD (Date display: Month – Day), the number in the LCD middle displays Year (Year 2012). 2. Press (M+) key to enter in P2.5 mode, or press (CAL/READ) key to return to the measurement mode.

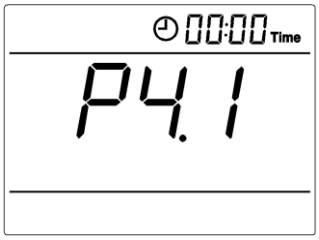
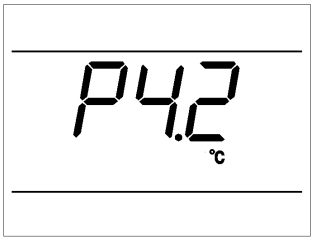
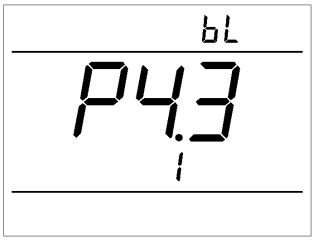
	**P2.5. – Select reference temperature (15.0°C-30.0°C)** 1. Press (ENTER) key, 25.0°C flashes, then press (M+) or (RM) key to adjust temperature value 15.0-30.0, press (ENTER) key to confirm. 2. After confirm parameter, press (M+) key to enter in P2.6 mode, or press (CAL READ) key to return to the measurement mode.
	**P2.6. – Adjust temperature compensation factor (0.00 -9.99%)** 1. Press (ENTER) key, 2.00 flashes, press (M+) key or (RM) key to adjust temperature compensation factor 0.00–9.99, press (ENTER) key to confirm. 2. After confirm the parameter, press (M+) key to enter in P2.7 mode, or press (CAL READ) key to return to the measurement mode.
	**P2.7. – Adjust TDS coefficient (0.40-1.00)** 1. Press (ENTER) key, 0.71 flashes, press (M+) key or (RM) key to adjust TDS coefficient 0.40 – 1.00, press (ENTER) key to confirm. 2. After confirm the parameter, press (M+) key to enter in P2.8 mode, or press (CAL READ) key to return to the measurement mode.
	**P2.8. – Restore to factory default setting (NO – Yes)** 1. Press (ENTER) key, **No** flashes, then press (M+) key, **Yes** flashes. When press (ENTER) key to confirm, the meter returns to the measurement mode. **No**–Not restore to factory default setting, **Yes** – restore to factory default setting. 2. When do not select **Yes**, press (CAL READ) key to return to the measurement mode.

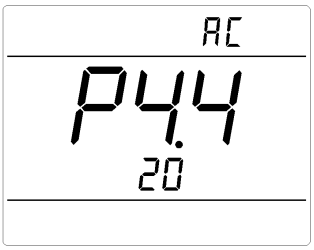
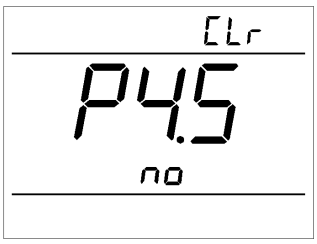
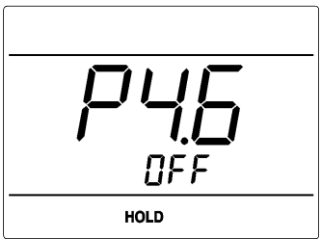
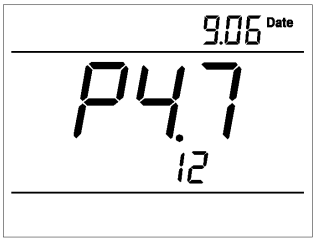
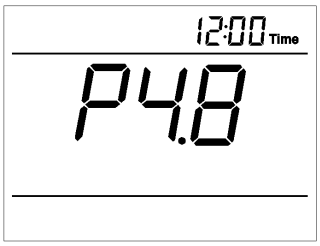
8.5. Submenu of DO (Dissolved Oxygen) parameter setup (press (M+) key or (RM) key to switch)

	**P3.1. – Select resolution (0.1 – 0.01mg/L (ppm), 0.1–1%)** 1. In P3.0 mode, press (ENTER) key to enter in P3.1 mode. Please refer to the left diagram, 2. Press (ENTER) key, 0.1 flashes, then press (M+) key, 0.01 flashes, when parameter flashes, press (ENTER) to confirm. 3. After confirm the parameter, press (M+) key to enter in mode P3.2, or press (CAL READ) key to return to the measurement mode.
	**P3.2. – Salinity calibration** Please refer to Item 7.3.3 for salinity calibration procedures.

	**P3.3. – Adjust barometric pressure value (60.0-199.9 kPa)** 1. Press (ENTER) key, 101.3 flashes (101.3 kPa is the barometric pressure value initially set), press (M+) key or (RM) key to revise the value according to the standard barometric pressure table, press (ENTER) to confirm. 2. After confirm the parameter, press (M+) key to enter in mode P3.4, or press (CAL/READ) key to return to the measurement mode.
	**P3.4. – Restore to factory default setting (NO – Yes)** 1. Press (ENTER) key, **No** flashes, then press (M+) key, **Yes** flashes. When press (ENTER) key to confirm, the meter returns to the measurement mode. **No** – Not restore to factory default setting, **Yes** – restore to factory default setting. 2. When do not select **Yes**, press (CAL/READ) key to return to the measurement mode.

8.6. Submenu of basic parameter setup (press (M+) key or (RM) key to switch)

	**P4.1. – Adjust timing storage time** 1. In mode P4.0, press (ENTER) key to enter in mode P4.1, refer to the left diagram: " **00:** ": hours (0-99), " **:00** ": minutes (0-59). 2. Press (ENTER) key, " **:00** " flashes, then press (ENTER) key, " **00:** " flashes. When the number flashes, press (M+) key and (RM) key to adjust time and press (ENTER) key to confirm. 3. After confirm the parameter, press (M+) key to enter in P4. 2 mode or press (CAL/READ) key to return to the measurement mode.
	**P4.2. – Select temperature unit (°C—°F).** 1. Press (ENTER) key, °C flashes, then press (M+) key, °F flashes. When the parameter flashes, press (ENTER) key to confirm. 2. After confirm the parameter, press (M+) key to enter in P4.3 mode or press (CAL/READ) key to return to the measurement mode.
	**P4.3. – Select backlight timing (1-2-3-On)** 1. When press (ENTER) key,"**1**" flashes, then press (M+) key to select blinking 2→3→On. When the parameter flashes, press (ENTER) key to confirm. Select **On** to turn on the backlight, the time unit is minute. 2. After confirm the parameter, press (M+) key to enter in P4.4 mode or press (CAL/READ) key to return to the measurement mode.

	**P4.4. – Select automatic power-off time (10-20-30-On)** 1. Press ENTER key, " **20** " flashes, then press M+ key to select blinking 30 →On→10. When the parameter flashes, press ENTER key to confirm. Select **On** to turn on the function, the unit is day. 2. After confirm the parameter, press M+ key to enter in P4.5 mode or press CAL/READ key to return to the measurement mode.
	**P4.5. – Clear all the stored value** 1. Press ENTER key, " **No** " flashes, then press M+ key " **Yes** " flashes. When the parameter flashes, press ENTER key to confirm. **No**: not delete, **Yes**: delete. 2. After confirm the parameter, press M+ to enter in P4.6 mode or press CAL/READ key to return to the measurement mode.
	**P4.6. – Set automatic lock-up function** 1. Press ENTER key, " **Off** " flashes, then press M+ key, " **On** " flashes. When the parameter flashes, press ENTER key to confirm. **Off**: not set, **On**: set (the reading is automatically locked when stabilizes **>** 10 seconds.) 2. After confirm the parameter, press M+ key to enter in P4.7 mode or
	**P4.7. – A CAL/READ st date** 1. Press ENTER key, "**Month**" flashes, then press ENTER key, "**Date**" flashes**,** then press ENTER key, "**Year**" flashes. When the number flashes, press M+ key or RM key to adjust date, then press ENTER key to confirm. Date display: Month - Date 2. After confirm the parameter, press M+ key to enter in P4.8 mode or press CAL/READ key to return to the measurement mode.
	**P4.8. – Adjust time** 1. Press ENTER key, "**Hour**" flashes, then press ENTER key, "**Minute**" flashes. When the number flashes, press M+ key and RM key to adjust time, then press ENTER to confirm. 2. After confirm the parameter, press CAL/READ key to to return to the measurement mode.

9. USB communication

9.1 System requirement

The meter uses “PC-Link” software with USB communication function. This software requires the computer to meet such requirement: Personal computer (Microsoft Excel 2000 or the version of higher rank) which can operate Windows XP operation system, PC – IBM compatible with XT and CD-ROM driver, USB communication port.

9.2 Software interface

Software interface: refer to.0 Diagram-21.

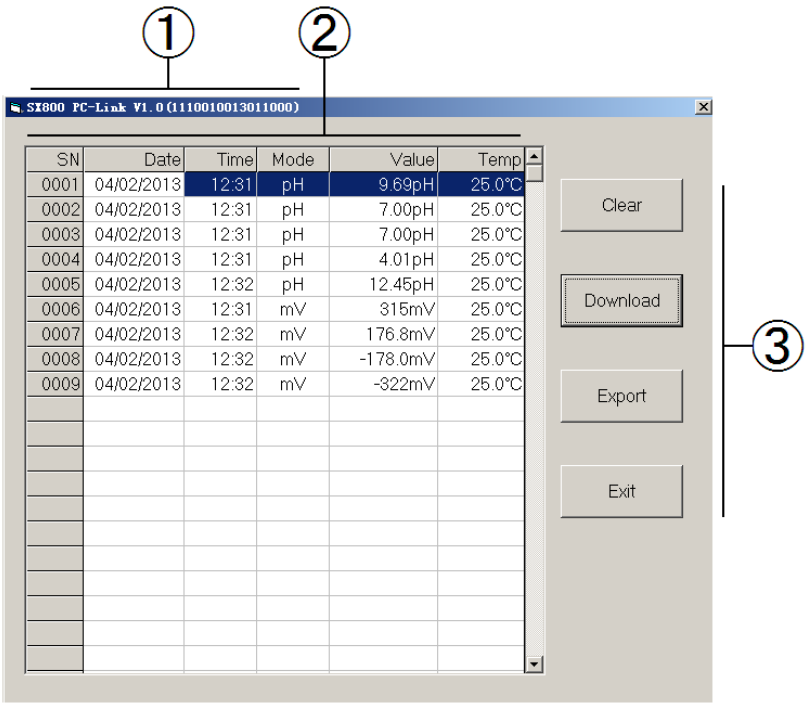


Diagram -21

1 — Meter serial number

2 — Stored value display area

3 — Keys

Clear — press this key to clear the data

Download — press this key to download the data from the meter to the computer, pH, mV, conductivity and dissolved oxygen are classified in the file.

Export — press this key to export the stored value to Microsoft Excel file

Exit — press this key, PC-Link program exits from the computer interface

9.3 Load software

Please follow the following steps to load PC-Link to the computer:

Open “PC-Link” file→double click “Setup” program → click “OK”→ click icons (refer to Diagram – 22) → click “Continue”→ click “Confirm”.

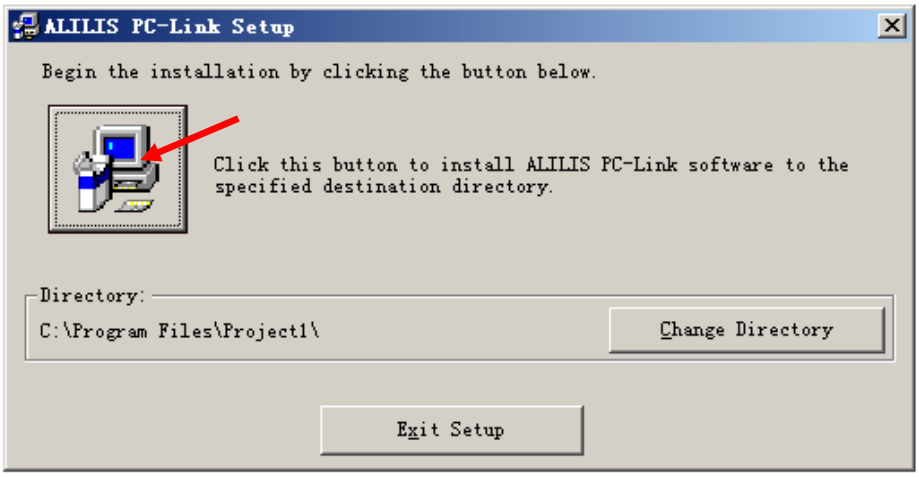


Diagram -22

9.4. Automatic connection port

Connect USB cable to the meter and the computer, open PC-Link program, program interface shows, automatic connection is done after a few seconds. icon shows at the left bottom of LCD.

Note: for re-connection after turn-off, the computer can not recognize the software automatically and please re-open the software interface.

Besides, this software only recognizes 1-16 port numbers. For other port numbers, please set in “ device manager” of the computer.

9.5. Run software

9.5.1. Upload the stored value

Press “**Download**” key, all the data stored in the meter is downloaded to the computer. pH and mV are sorted in the program.

9.5.2. Storage during operation

During operation, press  key to store or set timing storage. The measuring information is downloaded to the computer through USB and will not be stored in the meter. The stored data during operation is the same as the data shown on the meter.

9.5.3. Data processing

Press “**Export** ” key to export the stored value to Microsoft Excel file and then analyze or print the stored data.

10. Meter Kits

10.1. Standard configuration

No	Include	Qty	SX811	SX813	SX816	SX823	SX825	SX836
1.1	SX811 portable pH meter	1 set	√					
1.2	SX813 portable conductivity meter	1 set		√				
1.3	SX816 portable DO meter	1 set			√			
1.4	SX823 portable pH/conductivity meter	1 set				√		
1.5	SX825 portable pH/DO meter	1 set					√	
1.6	SX836 portable pH/Cond./DO meter	1 set						√
2.1	201T-Q plastic three-in-on pH electrode	1 pc	√			√	√	√
2.2	2301T-Q plastic conductivity electrode	1 pc		√		√		√
2.3	DO500 DO electrode	1 pc			√		√	√
3.1	pH standard buffer solution (4.00/7.00/10.01pH/50mL)	1 bottle each	√			√	√	√
3.2	Conductivity calibration solution (84μS /1413 μS/cm/12.88 mS/cm /50mL)	1 bottle each		√		√		√
4.1	DO501 DO inner solution (30mL)	1 pc			√		√	√
4.2	DO502 cathode polishing paper	2 pcs			√		√	√
4.3	DO503 DO electrode membrane cap	3 pcs			√		√	√
5.1	PC-Link communication software disk	1 disk	√	√	√	√	√	√
5.2	USB communication cable	1 pc	√	√	√	√	√	√

5.3	USB adaptor (DC 5V)	1 pc	√	√	√	√	√	√
5.4	Combined electrode clip	1 pc				√	√	√
5.5	Small portable case	1 pc	√	√				
5.6	Big portable case	1 pc			√	√	√	√
5.7	Manual	1 book	√	√	√	√	√	√

10.2. Selection on electrodes

No.	Electrode	Suited models	Features and applications
1	MP500-Q temperature sensor	SX811 SX823 SX825 SX836	Use with pH combination electrode
2	2501-C glass pH combination electrode		Suited for general water such as surface water, tap water, waste water and seawater, etc
3	2503-C glass pH combination electrode		Suited for turbid or colloidal solution such as milk, jam, water paint, cosmetics, waste water and sludge, etc
4	2503D-C glass pH combination electrode		Suited for solution with low ionic strength and high purity water
5	2015P-C surface pH combination electrode		Suited for medium with moist surface such as skin, paper, cloth, fruit, meat, colloidal solution and micro-solution
6	301Pt-C ORP combination electrode		Test ORP
7	DJS-0.1-Q glass conductivity electrode (K=0.1)	SX813 SX823 SX836	Test conductivity of high purity water, there is also flow cell, have automatic temperature compensation function
8	2310T-Q plastic conductivity electrode (K=10)		Suited for solution with polyelectrolyte such as seawater and strong brine, have automatic temperature Compensation function

11. Warranty

11.1. We warrant this instrument to be free of defects in parts and workmanship for **one year** from date of shipment.

11.2. The warranty does not apply to other electrodes except for temperature sensors. Besides, new electrode unused but found defected is free to be repaired or changed.

11.3. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification.

Appendix I: Parameter setup and factory default setup

Modes	Prompts	Parameter setting items	Abbreviation	Description	Restore to factory default setup
P1.0 pH	P1.1	Select pH buffer solution	buF	USA - NIST - CUS - CH	-
	P1.2	Set due calibration	dC	No - H00 - D00	No
	P1.3	Check the date of the last calibration	/	-	-
	P1.4	Set pH measurement mode of pure water	PU-1	Off - On	Off
	P1.5	Set pH measurement mode of pure water mixed with ammonia	PU-2	Off - On	Off
	P1.6	Restore factory default setting	FS	No - Yes	No
P2.0 Conductivity	P2.1	Select electrode constant	CELL	1.0 - 10.0 - 0.1	1.0
	P2.2	Select conductivity standard solution	SOL	USA - CUS - CH	-
	P2.3	Set due calibration	dC	No - H00 - D00	No
	P2.4	Check the date of the last calibration	/	-	-
	P2.5	Select reference temperature	trEF	15°C~30°C	25°C
	P2.6	Adjust temperature compensation coefficient	tCC	0.00~9.99	2.00

	P2.7	Adjust TDS factor	tdS	0.40~1.00	0.71
	P2.8	Restore factory default setting	FS	No - Yes	No
P3.0 DO	P3.1	Select resolution	rES	0.01/0.1(mg/L, ppm) 0.1/1(%)	0.01
	P3.2	Salinity calibration	SAL	-	-
	P3.3	Adjust barometric pressure value	AP	-	101.3
	P3.4	Restore factory default setting	FS	No-Yes	No
P4.0 Basic parameters	P4.1	Adjust storage timing	/	-	0:00
	P4.2	Select temperature unit	/	°C-°F	-
	P4.3	Select backlight time	bL	1 - 2 - 3 - On	1
	P4.4	Select auto power-off time	AC	10 - 20 - 30 - On	20
	P4.5	Clear stored value	CLr	No - Yes	No
	P4.6	Set up automatic lock-up function	/	Off—On	Off
	P4.7	Adjust date	/	-	-
	P4.8	Adjust time	/	-	-

Appendix II: Abbreviation glossary

Modes	Prompts	Code and abbreviation	In English	Description
P1.0 pH	P1.1	buF	Standard buffers	Standard buffer solution
	P1.2	dC	Due Calibration	Remind calibration
	P1.3	/		
	P1.4	PU-1	Pure water	Pure water
	P1.5	PU-2	Pure water mixed with ammonia	Pure water mixed with ammonia
	P1.6	FS	Factory default setting	Factory default setting
P2.0 Conductivity	P2.1	CELL	Cell	Constant Cell
	P2.2	SOL	Calibration solution	Calibration solution
	P2.3	dC	Due Calibration	Remind calibration
	P2.4	/		
	P2.5	trEF	Reference temperature	Reference temperature
	P2.6	tCC	Temperature compensation coefficient	Temperature compensation coefficient
	P2.7	tdS	TDS factor	TDS coefficient
	P2.8	FS	Factory default setting	Factory default setting

P3.0 DO	P3.1	rES	Resolution	Resolution
	P3.2	SAL	Salinity	Salinity
	P3.3	AP	Air pressure	Barometric air pressure
	P3.4	FS	Factory default setting	Factory default setting
P4.0 Basic parameters	P4.1	/		
	P4.2	/		
	P4.3	bL	Backlight	Backlight
	P4.4	AC	Auto power-off	Auto power-off
	P4.5	CLr	Clear readings	Clear readings
	P4.6	/		
	P4.7	/		
	P4.8	/		
Others		CH	China	China
		USA	United States of America	United States of America
		n IS	Nist	Nist
		OFF	Off	Off
		On	On	On
		no	No	No
		YES	Yes	Yes

Appendix III: Self-diagnosis information

Icons	Self-diagnosis information	pH	Conductivity	DO
Er 1	Wrong pH buffer solution or the buffer solution out of range	√	√	√
Er2	Press ENTER key when measuring value is not stable during calibration.	√	√	√
Er3	During calibration, the measuring value is not stable for ≥3min.	√	√	
Er4	pH electrode zero electric potential out of range (<-60mV or >60mV)	√		
Er5	pH electrode slope out of range (<85% or >110%)	√		
Er6	Enter in pre-set calibration date to remind calibration	√	√	

Appendix IV: DO of saturated water vs. temperature

Temperature (℃)	Dissolved Oxygen	Temperature (℃)	Dissolved Oxygen	Temperature (℃)	Dissolved Oxygen

	(mg/L)		(mg/L)		(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 V: DO of saturated water vs barometric pressure and temperature

Barometric pressure		Dissolved Oxygen Concentration (mg/L)		
mmHg	kPa	15°C	25°C	35°C
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

Conversion factor for mmHg and kPa: mmHg × 0.13333 = kPa

$DO_{pt} = P \times DO_t \div 760$

Note: DO_{pt} = DO concentration under temperature (t), barometric pressure (P, mg/L)

P = Barometric pressure (mmHg)

DO_t = DO concentration under temperature (t), barometric pressure (760mmHg, mg/L

760 = Barometric pressure (mmHg)

Appendix VI：DO of saturated water vs. altitude

Altitude		Barometric pressure		DO (25°C)	Altitude		Barometric pressure		DO (25°C)
Feet	meters	kPa	mmHg	mg/l	Feet	Meters	kPa	mmHg	mg/l
0	0	101.3	760	8.25	7500	2287	77.1	579	6.28
500	152	99.34	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