

# PH8500 Portable pH Meter

## Manual

- PH 8500 Portable pH Meter
- EC 8500 Portable Cond. Meter
- PC 8500 Portable pH/Cond. Meter



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## 1. Introduction

Thanks for purchasing 8500 series portable pH/Conductivity meter.

This meter is a perfect combination of the most advanced electronics technology, sensor technology, and software design, and is the most cost-effective portable pH/Conductivity measuring meter.

In order to use and maintain the instrument properly, please read the manual thoroughly before use.

In order to improve instrument performance continuously, we reserve the right to change the manual and accessories without giving notice in advance.

### 1.1. Measurement parameters

Measurement parameters	PH8500	EC8500	PC8500
pH/mV	√		√
Conductivity/TDS/Salinity		√	√
Temperature	√	√	√

### 1.2. Basic features

- The microprocessor-based portable meter features automatic calibration, automatic temperature compensation, function set-up, self-diagnostics, due calibration reminding, calibration date checking, automatic power-off and low voltage display. PC8500 meter is able to measure multiple parameters simultaneously. Please see Diagram -1: attach pH electrode and conductivity electrode together into the clip to measure simultaneously.
- Meet GLP, clock display, manual storage and automatic timing storage, USB port.
- The meter's digital filter improves measurement speed and accuracy. There is reading stability display.
- The package includes portable case, meter, electrode, standard solutions, soaking solutions, and all accessories, convenient to use in field.
- The meter is dust proof and waterproof, meeting the IP57 rating.



Diagram-1

### 1.3. pH measurement features (suited for model PH8500 and PC8500)

- 1-3 points automatic calibration, the meter provides calibration guide and automatic checking function.
- The meter is able to recognize pH standard buffer solutions automatically. There are three options of standard buffer solution: USA series, NIST series and customer-defined solution.
- The meter provides three kinds of reading stability criteria.

### 1.4. Conductivity measurement features (suited for model EC8500 and PC8500)

- 1-4 points automatic calibration, the meter provides calibration guide and automatic checking function.
- The meter is able to switch among conductivity, TDS and salinity measurement mode.
- The meter is able to recognize conductivity standard solutions automatically. There is "Standard" series and customer-defined solution.

## 2. Specifications

### 2.1. Main specifications

	Specifications		Models
pH	Measuring Range	(-2.00 ~ 16.00) pH	PH8500 PC8500
	Resolution	0.1/0.01 pH	
	Accuracy	±0.01pH ±1 digit	
	Temperature compensation	(0 ~ 100) °C (manual or automatic)	
mV	Measuring Range	±1,999mV	
	Resolution	±200 mV:0.1mV;others:1 mV	
	Accuracy	±0.1% F.S ±1 digit	
Conductivity	Measuring Range	Conductivity: 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) µg/L Salinity: (0~100) ppt	EC8500 PC8500
	Resolution	0.01/0.1/1µS/cm 0.01/0.1mS/cm	
	Accuracy	±1.0% F.S ±1 digit	
	Temperature compensation	(0 ~ 100) °C (manual or automatic)	
	Electrode constant	0.1 / 1 / 10cm <sup>-1</sup>	
Temperature	Measuring Range	-10~110°C	PH8500 EC8500 PC8500
	Resolution	0.1°C	
	Accuracy	±0.5°C±1 digit	

### 2.2. Other specifications:

Data storage	500 groups	
Storage content	Serial number, date, time, measuring value, measuring unit and temperature value	
Output	USB	
Power	AA batteries × 3 (1.5V× 3)	
IP rating	IP57 waterproof and dust proof	
Dimension & Weight	Meter: (86×196×33 ) mm / 335 g	
	Portable case: (330×270×82 ) mm /1.3 kg	PH8500 EC8500
	Portable case: (370×270×77 ) mm /1.8 kg	PC8500

### 3. Instrument Description

#### 3.1. LCD Display:

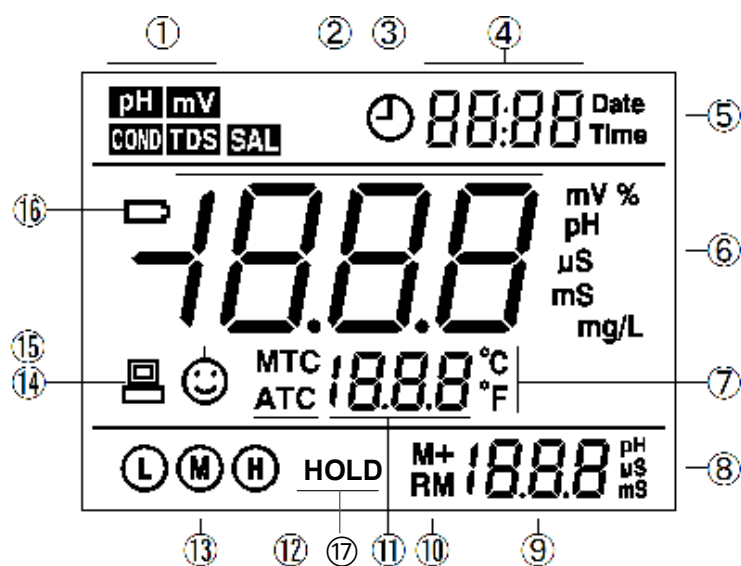


Diagram-2

- (1) — Measuring mode icons
- (2) — Measurement reading
- (3) — Timing storage icon. When this icon appears, the meter is in the automatic storage mode
- (4) — Date and time, or prompts of special display mode
- (5) — Units of date and time
- (6) — Units of measurement
- (7) — Temperature units
- (8) — Units of calibration value
- (9) — Standard 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) — Temperature compensation icons ,ATC — automatic temperature compensation,
  - MTC — manual temperature compensation
- (13) — Calibration guide icon
- (14) — USB icon, when this icon appears, the meter connects the computer
- (15) — Stability icon of readings
- (16) — Low battery icon, when this icon appears, please renew the battery
- (17) — Auto. Hold icon of readings

## 3.2. Keypad Functions

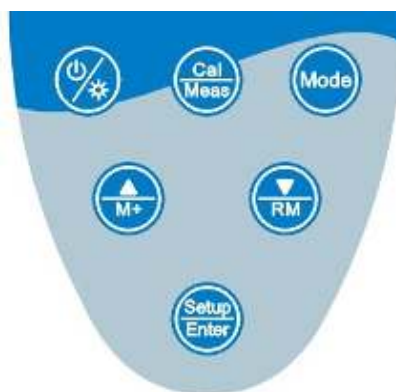


Diagram-3

### 3.2.1. Keypad operations

Short press <1.5 seconds , Long press >1.5 seconds.

Turn on the meter: press  to turn on the meter.

Turn off the meter: In the measurement mode, press  and hold for 2 seconds to turn off the meter.










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

Chart – 1 Keypad operations and descriptions

Keypad	Operations	Descriptions
	Short press	<ul style="list-style-type: none"> <li>● In the power-off mode, press this key to turn on the meter;</li> <li>● In the measurement mode, press this key to turn on or turn off the backlight display.</li> </ul>
	Long press	<ul style="list-style-type: none"> <li>● In the measurement mode, press and hold this key for 2 seconds to turn off the meter.</li> </ul>
	Short press	Select measurement parameter: <ul style="list-style-type: none"> <li>● PH8500 pH meter: <b>pH</b> → <b>mV</b> ;</li> <li>● EC8500 Conductivity meter: <b>COND</b> → <b>TDS</b> → <b>SAL</b> ;</li> <li>● PC8500 pH/Conductivity meter: <b>pH</b> → <b>mV</b> → <b>COND</b> → <b>TDS</b> → <b>SAL</b> ;</li> </ul>
	Short press	<ul style="list-style-type: none"> <li>● In the measurement mode, press this key to enter in the calibration mode;</li> <li>● In the auto. hold mode(HOLD), recall mode (RM) or other mode, press this key to return to the measurement mode,</li> </ul>
	Short press	<ul style="list-style-type: none"> <li>● In the measurement mode, press this key to enter in the parameter setup main menu;</li> <li>● In the calibration mode, press this key to make calibration;</li> <li>● In the parameter set-up mode, press this key to select programs;</li> <li>● In the recall mode(RM),press this key to return to the measurement Mode.</li> </ul>

	<p>Short/ long press</p>	<ul style="list-style-type: none"> <li>● In the measurement mode, long press to enter manual temperature compensation mode, long press this key or short press to increase temperature value;</li> <li>● In the measurement mode, press this key to store the measuring value;</li> <li>● In the recall mode (RM), short press this key to change the storage serial number, press and hold this key to change the number quickly;</li> <li>● In the parameter set-up mode, press this key to change the serial number of the main menu and the sub-menu;</li> <li>● In the sub-menu mode, press this key to change parameters and setup.</li> </ul>
	<p>Short/ long press</p>	<ul style="list-style-type: none"> <li>● In the measurement mode, long press to enter manual temperature compensation mode, long press this key or short press to decrease temperature value;</li> <li>● In the measurement mode, press this key to recall the last stored value;</li> <li>● 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;</li> <li>● In the parameter set-up mode, press this key to change the serial number of the main menu and the sub-menu;</li> <li>● In the sub-menu mode, press this key to change parameters and setup.</li> </ul>

### 3.3. Meter Socket

Electrode socket displays as Chart – 2. USB socket displays as Chart– 3.

Chart – 2 Sockets for meters






Models	Photos	Description
<p>PH 8500 pH meter</p>		<ul style="list-style-type: none"> <li>● BNC socket (right) — connect pH electrode or ORP electrode,</li> <li>● RCA socket (middle) — connect temperature probe</li> </ul>
<p>EC 8500 Conductivity meter</p>		<ul style="list-style-type: none"> <li>● Eight-pin socket (left) — connect conductivity electrode</li> </ul>
<p>PC 8500 pH/Conductivity meter</p>		<ul style="list-style-type: none"> <li>● BNC socket (right) — connect pH electrode or ORP electrode,</li> <li>● RCA socket (middle) — connect temperature probe</li> <li>● Eight-pin socket (left) — connect conductivity electrode</li> </ul>

Chart – 3 USB socket

Functions	Connect to meter	Description
USB communication		<ul style="list-style-type: none"> <li>The meter has USB communication function, connecting the meter to a computer by USB cable.</li> </ul>
Computer or external power supply		<ul style="list-style-type: none"> <li>Computer power supply: connect the meter to a computer by USB cable,</li> <li>External power supply: use USB cable and USB adapter, input voltage: AC110V~220V.</li> </ul>

### 3.4. Display Mode

#### 3.4.1 Reading stability display mode

When the measuring value is stable, smiley icon ☺ appears on LCD, see Diagram – 4. If the ☺ icon does not appear or flash, please do not record the reading value or make calibration until the measuring value is stable. Per parameter P1.3, there are 3 criteria for stability standard: *nor* (Normal), *Hi* (High) and *Lo* (Low). The factory default is set “Normal”. “High” is set for stability over a longer time, “Low” is set for stability over a shorter time. User can select suitable stability criteria according to different testing requirement.



Diagram - 4

#### 3.4.2. Automatic lock-up display mode



Select On from parameter P3.6 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 – 5. In the HOLD mode, press  to release lock-up.



Diagram - 5

### 3.5. Store, Recall and Clear Readings

#### 3.5.1. Manual storage

When the measurement is stable, short press  key, **M+** icon and storage serial number appear on LCD, storing measuring information, see Diagram – 6.

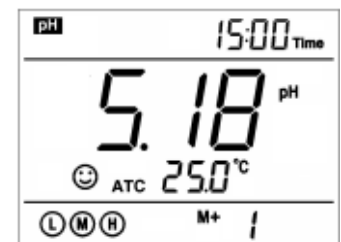







Diagram - 6

#### 3.5.2. Automatic timing storage

Set the storage timing (eg. 3 minutes) in parameter setting P3.3,  icon appears on LCD and the meter enters into the timing storage mode. When short press  key,  key flashes and the first measuring value is stored. After 3 minutes, the 2<sup>nd</sup> measuring value is stored. See Diagram – 7: the meter stores automatically eight measuring values. When short press  key,  icon stops flashing and the meter stops automatic storage. In automatic storage mode, manual storage does not work. Set time 0 in parameter setting P3.3 to exit from the automatic storage mode.

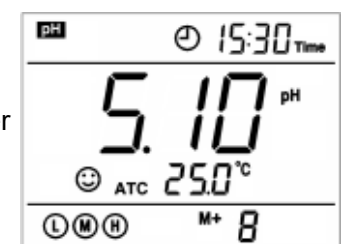








Diagram - 7



### 3.5.3. Recall stored value

In the measurement mode, press  key to recall the last stored measuring value. See Diagram – 8: display RM icon and storage serial number. Continue pressing  key and  key to recall successively the stored measuring value. Press and hold  key and  key to recall the stored measuring value quickly. Press  to return to measuring mode.

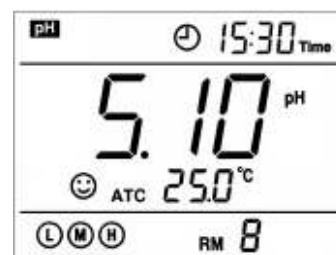


Diagram - 8






### 3.5.4. Clear stored value

Select YES per parameter P3.6 to clear all stored value, refer to clause 7.5.

### 3.6. Auto. Power-off

The meter will be power-off after the meter stops operation for 20 minutes. To set automatic power off time in parameter setting P3.7

### 3.7. Temperature Adjustment

When the temperature probe is not connected to the meter, press and hold  key or  key, temperature value flashes, then press (or press and hold)  key or  key to change the temperature value, and press  key to confirm.

## 4. pH measurement

### 4.1. pH electrode information




The meter connects to 201T-F plastic three-in-one combination pH electrode with built-in temperature sensor, with automatic temperature compensation function. Electrode housing is made of polycarbonate engineering plastics, which is corrosion and impact resistant. The BNC socket of electrode connects pH socket. RCA socket connects temperature socket. When dipping pH electrode in the solution, please stir the solution briefly to eliminate any air bubbles and allow it to stay in the solution until the reading is stable

### 4.2. pH Calibration Consideration

#### 4.2.1. Standard buffer solution

The meter uses two series of standard buffer solution: USA series and NIST series, each series consists of 5 groups solution, icons see Chart - 4

Chart - 4 pH standard buffer solution series

Calibration guide icons		pH standard buffer solution series	
		USA series (USA)	NIST series (NIS)
Three-point calibration		1.68 pH and 4.00 pH	1.68 pH and 4.01 pH
		7.00 pH	6.86pH
		10.01 pH and 12.45 pH	9.18 pH and 12.45 pH

#### 4.2.2. Three-point calibration

The instrument can perform 1-3 points calibration. The first point calibration must be 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.

Chart - 5 Three-point calibration mode

	USA standard	NIST standard	Icons	Suited range
One-point calibration	7.00 pH	6.86 pH	(M)	Accuracy $\leq \pm 0.1\text{pH}$
Two-point calibration	7.00 pH → 4.00 or 1.68pH	6.86 pH → 4.01 or 1.68pH	(L) (M)	Range < 7.00pH
	7.00 pH → 10.01 or 2.45pH	6.86 pH → 9.18 or 12.45pH	(M) (H)	Range > 7.00pH
Three-point calibration	7.00pH → 4.00 or 1.68pH → 10.01 or 12.45pH	6.86pH → 4.01 or 1.68pH → 9.18 or 12.45pH	(L) (M) (H)	Large Range

#### 4.2.3. Calibration intervals

Calibration intervals depend on the sample, the electrode performance, and the required accuracy. For high accuracy measurements ( $\leq \pm 0.03\text{pH}$ ), the meter should be calibrated immediately before taking a measurement. For general accuracy ( $\geq \pm 0.1\text{pH}$ ), the meter can be calibrated and used for approximately one week before the next calibration. The meter must be re-calibrated in the following situations:

- (a) New probe, or probe that is unused for a long period of time
- (b) After measuring acids ( $\text{pH} < 2$ ) or alkaline solutions ( $\text{pH} > 12$ )
- (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

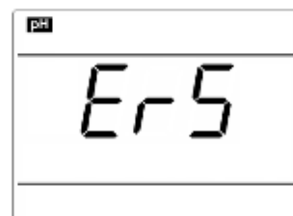


Diagram - 9

#### 4.2.4. Due calibration

Preset calibration interval (begin from the date of last calibration) to remind due calibration in a preset period in parameter setting P1.4 (clause 7.3). During due calibration, **Er5** icon appears on LCD (see Diagram – 9). The meter can not continue operation and **Er5** icon disappears until the calibration is done, or when select “No” in parameter setting P1.4.







#### 4.2.5. Check calibration date

Check the date and time of last calibration to decide whether new calibration is needed. Please refer to parameter setting P1.5 (clause 7.3).

### 4.3. pH Calibration (take three-point calibration as an example)





#### 4.3.1. The 1<sup>st</sup> point calibration

(a) Press  key to enter into the calibration mode, CAL 1 blinks at the top right of LCD and “7.00 pH” blinks at the bottom right of LCD, indicating using pH 7.00 buffer solution to make the 1<sup>st</sup> point calibration.





(b) Rinse pH electrode in pure water, allow it to dry, and submerge it in pH 7.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. LCD displays , press  to finish 1<sup>st</sup> point calibration, meter goes to measurement mode, the bottom left of LCD indicating , See Diagram – 10.

#### 4.3.2. The 2<sup>nd</sup> point calibration





Press  key to enter into the calibration mode, CAL 2 blinks at the top right of LCD, indicating make the 2<sup>nd</sup> point calibration. Rinse pH electrode in pure water, allow it to dry, 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  key to calibrate the meter. Electrode slope of acidity range display after calibration is done, the 2<sup>nd</sup> point calibration finished, meter goes to measurement mode, the bottom left of LCD indicating .

#### 4.3.3. The 3<sup>rd</sup> point calibration

Press  key to enter into the calibration mode, CAL 3 blinks at the top right of LCD indicating make the 3<sup>rd</sup> point calibration. Rinse pH electrode in pure water, allow it to dry, submerge it in pH10.01 buffer solution, Stir the solution briefly and allow it to stay in the buffer solution until the reading is stabilized. The meter's display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. When the meter locks 10.01pH, stable icon  displays on LCD. Press  key to calibrate the meter. Electrode slope of acidity range display after calibration is done. After the 3<sup>rd</sup> point calibration is completed, meter goes to measurement mode, the bottom left of LCD indicating .

#### Notes:



(a) The meter can perform 1-3 points calibration. When the 1<sup>st</sup> point calibration is done, meter goes to measurement mode under 1<sup>st</sup> point calibration mode. Same procedure as 2<sup>nd</sup> point calibration and 3<sup>rd</sup> point calibration.




(b) During calibration process, if a stable reading has not been reached, no  displays on LCD, press  key, Er2 will displays on LCD, See Chart - 6






(c) In calibration mode, press  key to exit.

#### 4.4. Customer-defined calibration (take 1.60 pH and 6.50 pH calibration solution as an example)





4.4.1. Select CUS from parameter setting P1.1 (please refer to clause 7.3 for customer-defined solution). The meter enters into Customer-defined calibration mode.

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  key and the measuring value flashes.

CAL1 blinks at the top right of LCD, indicating 1<sup>st</sup> point calibration of customer-defined solution. Press  key or  key to adjust the measuring value to 1.60, then press  key to calibrate the meter. After calibration is done, meter goes to measurement mode.

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  key and the measuring value flashes. CAL 2 blinks at the top right of LCD, indicating 2<sup>nd</sup> point calibration of customer-defined solution, Press  key or  key to adjust the measurement value to 6.50, then press  key to calibrate the meter. After calibration is done, the meter returns to the measurement mode.


#### Notes:

(a) For manual temperature compensation (temperature probe didn't plug in RCA socket), when press  key, the temperature value flashes. Press  key or  key to adjust the temperature value, and then press  key, pH measuring value flashes.

(b) The meter can perform 1-2 points customer-defined calibration. When the 1<sup>st</sup> point calibration is done, the meter goes to measurement mode automatically. Likewise in customer-defined 2<sup>nd</sup> point calibration.

(c) 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-11 for calibration and measurement process of pH meter.

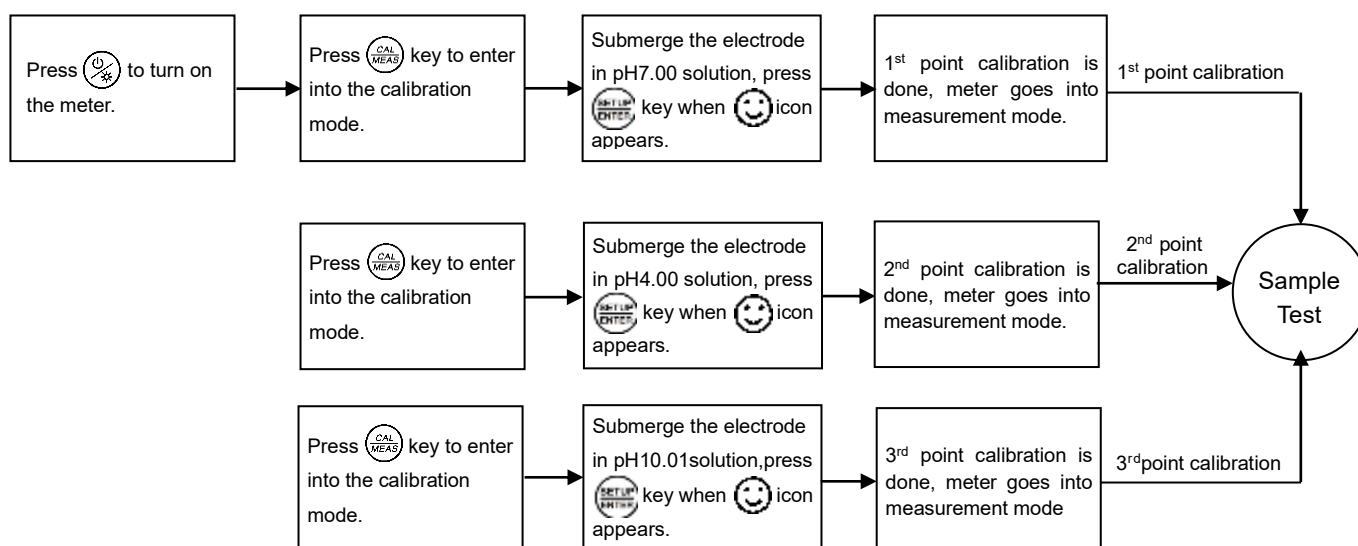






Diagram – 11 Calibration and measurement process of pH meter

#### 4.5.2. 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.
Er 2	Press  key when measuring value is not stable during calibration.	Press  key when  icon appears.
Er 3	During calibration, the measuring value is not stable for $\geq 3$ min.	1.Check whether there are bubbles in glass bulb. 2.Replace with a new pH electrode.
Er 4	pH electrode performance error ( zero potential $< -60$ mV or $> 60$ mV, slope $< 75\%$ )	1.Check whether there are bubbles in glass bulb. 2.Check whether pH buffer solution is correct. 3.Replace with new pH electrode.
Er 5	Enter in pre-set due calibration date reminder	Press  key to perform calibration or cancel due calibration setup per parameter P1.4

#### 4.5.3. pH temperature principle

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

#### 4.5.4. Factory default setting

For factory default setting, please refer to parameter P1.6 (clause 7.3). 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 be irretrievable.

### 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 method to prepare this solution: add 26g KCL in 100ml pure water).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 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 aged. Submerge the electrode in 0.1 mol/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	Cleaning Solutions
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)
Paints	Dilute bleach, peroxide

#### Notes:

**The electrode housing is polycarbonate. When using cleaning solutions, take precautions with carbon tetrachloride, trichlorethylene, tetrahydrofuran, acetone, etc, as these will dissolve the housing and invalidate the electrode.**

#### 5. mV Measurement:

5.1. Press  key, and switch the meter to mV measurement mode. Connect ORP electrode (purchased separately) and dip it in sample solution, stir the solution briefly and allow it to stay in the solution until icon appears  get the reading which is ORP value. ORP means Oxidation Reduction Potential. The unit is mV.

#### 5.2. Notes:

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 long period of time, the platinum surface will get contaminated and will lead to inaccurate measurements and slow responses. Please refer to the following methods to clean and activate ORP electrode:

(a) For inorganic pollutants, 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 pollutants, 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 an 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-S plastic conductivity electrode with constant  $K=1.0$  and built-in temperature sensor, with automatic temperature compensation function. The electrode housing is POM plastic which is corrosion resistant and impact resistant. When submerging the conductivity electrode in solution, stir the solution briefly to remove any the air bubbles. This will improve response time 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 per parameter P2.1 and refer to clause 7.4.

Chart –8 Electrode constant and measuring range

Range	<20 $\mu\text{S/cm}$	0.5 $\mu\text{S/cm}$ ~100mS/cm			> 100mS/cm
Conductivity electrode constant	$K=0.1 \text{ cm}^{-1}$	$K=1.0 \text{ cm}^{-1}$			$K=10 \text{ cm}^{-1}$
Standard solution	84 $\mu\text{S/cm}$	84 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	12.88mS/cm	111.9mS/cm




### 6.2. Conductivity calibration consideration

#### 6.2.1. Conductivity calibration solutions

The meter uses conductivity standard solution: 84 $\mu\text{S/cm}$ , 1413 $\mu\text{S/cm}$ , 12.88mS/cm, 111.9mS/cm. Select the standard solution per parameter P2.2 (clause 7.4). The meter can recognize the standard solution automatically, can perform one-point or multi-points calibration (the maximum is four-point calibration). The calibration guide icons correspond to the four standard values. (  corresponds to two groups of solutions)

See chart – 9:

Chart – 9 Conductivity standard solution series

Calibration guide icons	Calibration solution series	Range
	84 $\mu\text{S/cm}$	0-200 $\mu\text{S/cm}$
	1413 $\mu\text{S/cm}$	200-2,000 $\mu\text{S/cm}$
	12.88mS/cm	2-20mS/cm
	111.9mS/cm	20-200mS/cm

#### 6.2.2. Calibration intervals

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

- (b) Perform calibration once per month.
- (c) For high accuracy measurements or large temperature deviations 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 errors.
- (e) For new electrode or factory default setting, perform 3-point or 4-point calibrations. Choose closer standard solution to the sample solution to perform 1- point or 2-point calibration.

### 6.2.3. Reference temperature

Reference temperature of factory default is 25°C. Other reference temperature can also be set for range 15°C – 30°C. Select in parameter setting P2.3 and see clause 7.4.

### 6.2.4. Temperature coefficient

The temperature compensation coefficient of the meter setting is 2.00%/°C. 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 per parameter P2.4. and see clause 7.4.

#### Notes:

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

Chart – 10 Temperature compensation coefficient of special solutions

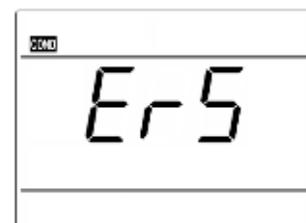
Solution	Temperature compensation coefficient
NaCl salt solution	2.12%/°C
5%NaOH solution	1.72%/°C
Dilute ammonia solution	1.88%/°C
10% hydrochloric acid solution	1.32%/°C
5% sulfuric acid solution	0.96%/°C

### 6.2.5. Avoid contamination of standard solution

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

### 6.2.6. Due calibration

Pre-set calibration intervals (begin from the date of last calibration) to remind





due calibration in a preset period in parameter setting P2.6 (clause 7.4). During due calibration, **Er5** icon appears on LCD (see Diagram – 12). The meter cannot continue operation and **Er5** icon disappears until the calibration is done, or when select “No” in parameter setting P2.6.

Diagram - 12

### 6.2.7. Check the calibration date


Check the last calibration date to see whether a new calibration is needed per parameter P2.7. (clause 7.4.)


## 6.3. Conductivity Calibration (take calibration with 1413µS/cm as an example)


6.3.1. Rinse pH electrode in pure water, allow it to dry, wash with a little of standard solution and submerge it in standard solution. Stir the solution briefly and allow it to stay in the solution until a stable reading is reached.

6.3.2. Press  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 calibration solution at the bottom right.

When the meter locks 1413 µS, stable  icon displays on LCD.

Press  key to finish calibration, meter goes into measurement mode.

LCD shows  icon at the bottom left. See Diagram – 13

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

### 6.3.4. Notes

(a) **Er 2** appears if press  key before the value is locked.

See chart – 12.

(b) If return from calibration mode, press  to exit.

## 6.4. Relations among TDS, salinity and conductivity

6.4.1. TDS and conductivity is linear related. The conversion factor is 0.40-1.00.

Adjust per parameter P2.5. The factory default setting is 0.71 to see clause 7.4.

Salinity and conductivity are interrelated, the factor is 0.5, The meter can only be calibrated in conductivity mode and not TDS mode. After calibration of conductivity, the meter can switch from conductivity to TDS or salinity.

6.4.2. Adjust TDS conversion factor per parameter P2.5 according to the data collected during testing. See chart – 11: commonly used TDS conversion factors.







Diagram - 13

Chart – 11 Commonly used TDS conversion factors





Conductivity of solution	TDS conversion factor
0-100 $\mu\text{S}/\text{cm}$	0.60
100-1,000 $\mu\text{S}/\text{cm}$	0.71
1-10 $\text{mS}/\text{cm}$	0.81
10-100 $\text{mS}/\text{cm}$	0.94

### 6.5. Customer-Defined Calibration (take 10.50 $\mu\text{S}/\text{cm}$ standard solution as an example)

6.5.1 Select **CUS** per parameter P2.2 (please refer to clause 7.4 for customer-defined solution). The meter enters into Customer-defined calibration mode.


6.5.2. Rinse the electrode in pure water, allow it to dry, and submerge it in 10.50 $\mu\text{S}/\text{cm}$  standard solution. Stir the solution briefly and allow it to stay in the solution until a stable reading is reached and  icon appears on LCD. Press  key or  key to adjust the measuring value to 10.50 $\mu\text{S}/\text{cm}$ , Press  key to calibrate the meter. meter returns to the measurement mode. In conductivity measurement mode with customer-defined calibration, the meter does not display electrode calibration guide icon.


#### Notes:

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





6.5.3. 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 has 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.

6.6.2. Press  key to switch to TDS and salinity.

6.6.3. During the process of calibration and measurement, the meter has self-diagnosis functions, indicating the relative information as below: chart – 12.

Display Icons	Contents	Checking
Er 1	Wrong conductivity calibration solution or the recognition range of calibration solution exceeds standard.	<ol style="list-style-type: none"> <li>1. Check whether conductivity calibration solution is correct.</li> <li>2. Check whether the meter connects the electrode well.</li> <li>3. Check whether the electrode is damaged.</li> </ol>
Er 2	Press  key when measuring value is not stable during calibration.	Press  key when  icon appears
Er 3	During calibration, the measuring value is not stable for $\geq 3$ min.	<ol style="list-style-type: none"> <li>1. Shake the electrode to eliminate bubbles in electrode head.</li> <li>2. Replace with a new conductivity electrode.</li> </ol>
Er 5	Enter in pre-set due calibration to remind calibration	Press  key to perform calibration or cancel due calibration setup per parameter P2.6.

#### 6.6.4. Factory default setting

For factory default setting, please refer to parameter P2.8 (clause 7.4). All calibration data is deleted and the meter restores to the theory value. Some functions restore to the original value (refer to appendix -1). When calibration or measurement fails, please restore the meter to factory default setting and then perform re-calibration or measurement. Please note once factory default setting is set, 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 submerging the electrode in 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. Rinse the electrode in pure water after measurement.

6.7.2. The interaction pole of Model 2301T-S conductivity electrode is coated with platinum black to minimize electrode polarization and expand measuring range. The platinum black coating applied by a special processing technology, which improves the electrode performance and the robustness of the coating. If the platinum black electrode is stained, gently clean the electrode with a soft brush in warm water containing detergent or alcohol.

## 7. Parameter setting

### 7.1 Main menu

In the measurement mode, press  key to enter in P1.0, then press  or  to switch to main menu: P1.0→P2.0→P3.0. Please refer to Diagram – 14.




P1.0: pH parameter setting menu,




P2.0: Conductivity parameter setting menu,



P3.0: Basic parameter setting menu.

### 7.2 Sub-menu



7.2.1. In P1.0 mode, press  key to enter in sub-menu P1.1 of pH parameter setting, then press  and  key to switch among sub-menu: P1.1→P1.2→P1.3→P1.4→P1.5→P1.6, See Diagram-14.

7.2.2. In P2.0 mode, press  key to enter in sub-menu P2.1 of conductivity parameter setting, then press and  key  switch among sub-menu: P2.1→P2.2→P2.3→P2.4→P2.5→P2.6→P2.7→ P2.8, See Diagram – 14.

7.2.3. In P3.0 mode, press  key to enter in sub-menu P3.1 of TDS parameter setting, then press and  key to switch among sub-menu: P3.1→P3.2→P3.3→P3.4→P3.5→P3.6→P3.7→P3.8, See Diagram – 14

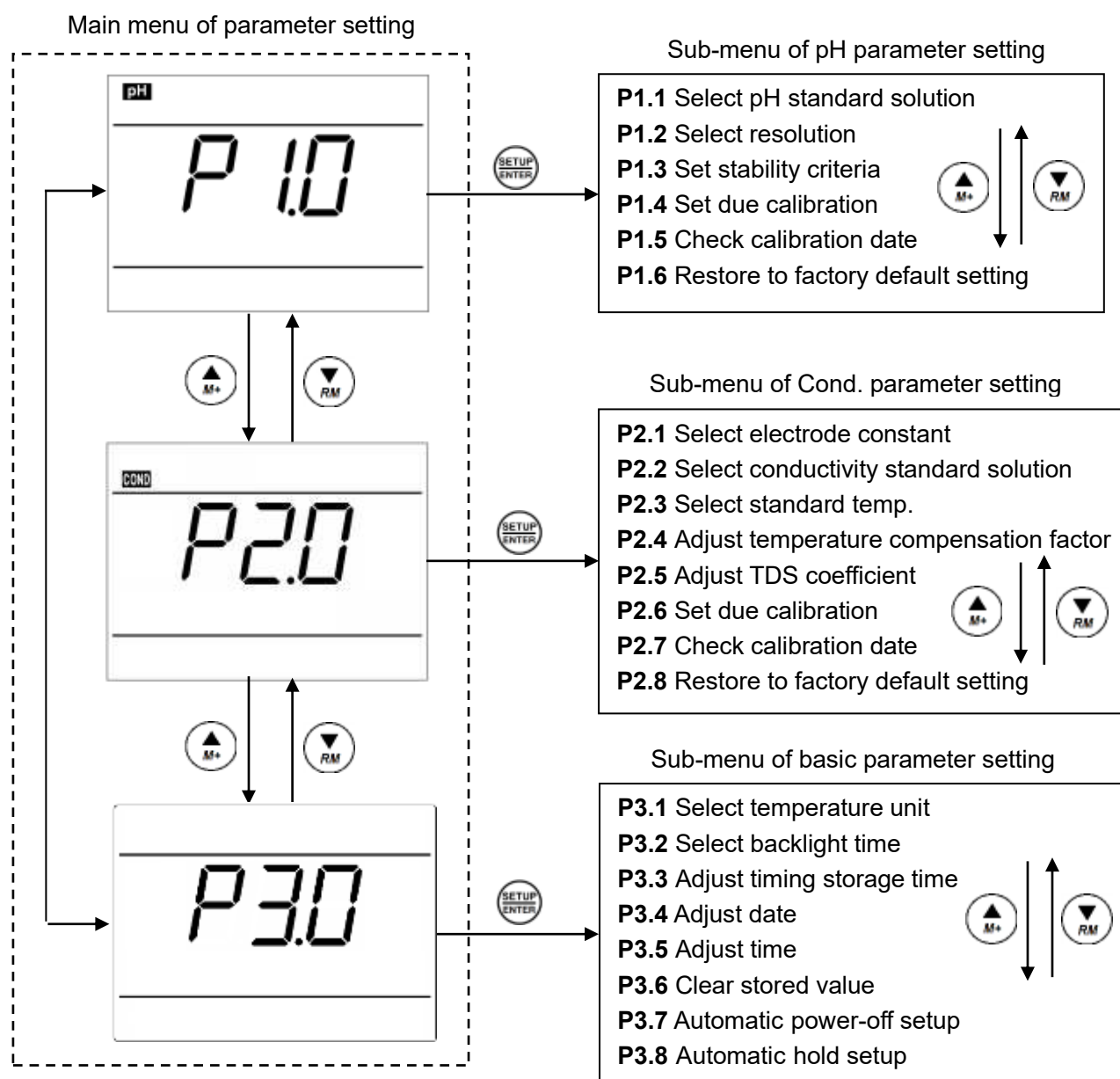
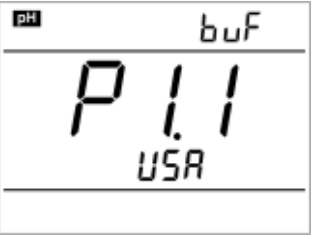













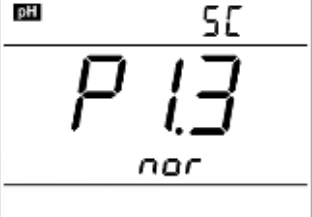
































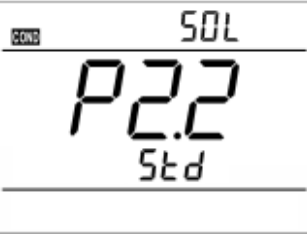



















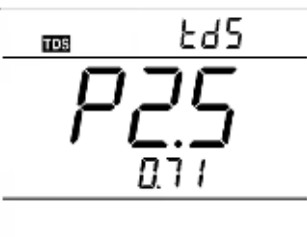




















Diagram – 14 Main menu and sub-menu of parameter setting









**7.3. Sub-menu of pH parameter setting (press  or  key to switch)**

 <p>The LCD display shows 'pH' in the top left corner, 'buf' at the top right, 'P 1.1' in the center, and 'USA' at the bottom.</p>	<p><b>P1.1 – Select pH standard solution (USA-NIST-CUS)</b></p> <ol style="list-style-type: none"> <li>1. In measurement mode, press  key to enter in P1.0, press  to enter in P1.1.</li> <li>2. When press  key, <b>USA</b> blinks, press  key to select USA→nIS →CUS, press  to confirm. USA-USA series; nIS-NIST series; CUS- customer-defined.</li> <li>3. After confirm parameter, press  key to enter in P1.2 mode, or press  key to return to the measurement mode.</li> </ol>
 <p>The LCD display shows 'pH' in the top left corner, 'rES' at the top right, 'P 1.2' in the center, and '0.01' at the bottom.</p>	<p><b>P1.2 – Select resolution (0.01 – 0.1)</b></p> <ol style="list-style-type: none"> <li>1. When press  key, <b>0.01</b> blinks, then press  key to select 0.01 →0.1, press  key to confirm.</li> <li>2. After confirmed parameter , press  key to enter in P1.3 mode, or press  key to return to the measurement mode.</li> </ol>
 <p>The LCD display shows 'pH' in the top left corner, 'SC' at the top right, 'P 1.3' in the center, and 'nor' at the bottom.</p>	<p><b>P1.3 – Set stability criteria (Normal – High – Low)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>nor</b> blinks. Press  key to select nor→HI→Lo, press  to confirm. Nor – Normal, Hi – High, Lo – Low.</li> <li>2. After confirmed parameter, Press  key to enter in P1.4 mode, or press  key to return to the measurement mode.</li> </ol>
 <p>The LCD display shows 'pH' in the top left corner, 'dC' at the top right, 'P 1.4' in the center, and 'no' at the bottom.</p>	<p><b>P1.4 – Set due calibration (No – H00 – D00)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>no</b> blinks, then press  key to select <b>no</b>→H00→d00 Press  to confirm.</li> <li>2. When <b>H</b> blinks, press  key, <b>00</b> blinks. Press  key to adjust hours (0~99 hours), press  key to confirm; When <b>D</b> blinks. press  key, <b>00</b> blinks. Press  key to adjust days (0~99 days),press  key to confirm.</li> <li>3. After confirm parameter, press  key to enter in P1.5 mode, or press  key to return to the measurement mode.</li> </ol>
 <p>The LCD display shows 'pH' in the top left corner, '15:08 Time' at the top right, 'P 1.5' in the center, and '16' at the bottom.</p>	<p><b>P1.5 - Check the time and date of the last calibration</b></p> <ol style="list-style-type: none"> <li>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 2016).</li> <li>2. Press  key to enter in P1.6 mode, or press  key to return to the measurement mode.</li> </ol>
 <p>The LCD display shows 'pH' in the top left corner, 'FS' at the top right, 'P 1.6' in the center, and 'no' at the bottom.</p>	<p><b>P1.6 – Restore to factory default setting (NO – Yes)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>no</b> blinks, then press  key to select no → YES, Press  key to confirm, the meter returns to the measurement mode. No – not restore to factory default setting, Yes – restore to factory default setting.</li> <li>2. Press  key to return to the measurement mode.</li> </ol>

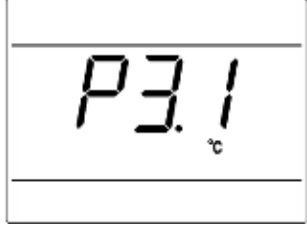






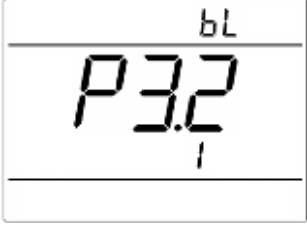





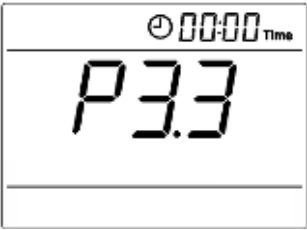
















**7.4. Sub-menu of conductivity parameter setting (press  key or  key to switch)**


























	<p><b>P2.1 – Select electrode constant (1.0-10.0-0.1)</b></p> <ol style="list-style-type: none"> <li>1. In P2.0 mode, press  key to enter in P2.1 mode, please refer to the left Diagram.</li> <li>2. Press  key, <b>1.0</b> blinks, then press  key to select blinking 1.0 → 10.0→0.1, when parameter blinks, press  key to confirm.</li> <li>3. After confirm the parameter, press  key to enter in P2.2 mode, or press  key to return to the measurement mode.</li> </ol>
	<p><b>P2.2 – Select conductivity standard solution (Standard-CUS)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>Std</b> blinks, then press  key select Std→CUS, press  to confirm. Std – Standard series, CUS – customer defined.</li> <li>2. After confirm the parameter, press  key to enter in P2.3 mode, or press  key to return to the measurement mode.</li> </ol>
	<p><b>P2.3 – Select reference temperature (15.0°C~30.0°C)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>25.0°C</b> blinks, then press  or  key to adjust temperature value 15.0~30.0, press  key to confirm.</li> <li>2. After confirm parameter, press  key to enter in P2.4 mode, or press  key to return to the measurement mode.</li> </ol>
	<p><b>P2.4 – Adjust temperature compensation factor (0.00 ~9.99%)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>2.00</b> blinks, press  key or  key to adjust temperature compensation factor 0.00–9.99, press  key to confirm.</li> <li>2. After confirm the parameter, press  key to enter in P2.5 mode, or press  key to return to the measurement mode.</li> </ol>
	<p><b>P2.5 – Adjust TDS coefficient (0.40~1.00)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>0.71</b> blinks, press  key or  key to adjust TDS Coefficient (0.40~1.00 ), press  key to confirm.</li> <li>2. After confirm the parameter, press  key to enter in P2.6 mode, or Press  key to return to the measurement mode.</li> </ol>
	<p><b>P2.6 – Set due calibration (No – H00 – D00)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>no</b> blinks, then press  key to select no→H00→d00 Press  to confirm.</li> <li>2. When <b>H</b> blinks, press  key, <b>00</b> blinks. Press  key to adjust Hours( 0~99 hours), press  key to confirm; When <b>D</b> blinks. press  key, <b>00</b> blinks. Press  key to adjust days (0~99 days), press  key to confirm.</li> <li>3. After confirm parameter, press  key to enter in P2.7 mode, or press  key to return to the measurement mode.</li> </ol>



	<p><b>P2.7 – Check the date of the last calibration</b></p> <ol style="list-style-type: none"> <li>1. The date and time of the last calibration shown on top right of LCD, middle number indicates: year 2016.</li> <li>2. Press  key to enter in P2.8 mode, or press  key to return to the measurement mode.</li> </ol>
	<p><b>P2.8 – Restore to factory default setting (NO – Yes)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>no</b> blinks, then press  key to select no→YES, press  key to confirm, the meter returns to the measurement mode. No—not restore to factory default setting, Yes—restore to factory default setting.</li> <li>2. When do not select Yes, press  key to return to the measurement mode.</li> </ol>

**7.5. Sub-menu of basic parameter setting (press  key or  key to switch)**

	<p><b>P3.1 – Select temperature unit (°C—°F).</b></p> <ol style="list-style-type: none"> <li>1. In P3.0 mode, press  key enter P3.1, see left diagram.</li> <li>2. Press  key, °C blinks, press  to select °C →°F, then press  key to confirm,</li> <li>3. After confirm the parameter, press  key to enter in P3.2 mode. or press  key to return to the measurement mode.</li> </ol>
	<p><b>P3.2 – Select backlight timing (1-2-3-On)</b></p> <ol style="list-style-type: none"> <li>1. When press  key, <b>1</b> blinks, then press  key to select 1→2→3→ On. When the parameter blinks, press  key to confirm. Select On to turn on the back light, the time unit is minute.</li> <li>2. After confirm the parameter, press  key to enter in P3.3 mode or press  key to return to the measurement mode.</li> </ol>
	<p><b>P3.3 – Adjust timing storage time</b></p> <ol style="list-style-type: none"> <li>1. When press  key, <b>:00</b> blinks, press  key and  key to adjust timing(0~59), press  key, <b>00:</b> blinks: adjust hours (0-99), press  to confirm.</li> <li>2. After confirm the parameter, press  key to enter in P3.4 mode or press  key to return to the measurement mode.</li> </ol>
	<p><b>P3.4. – Adjust date</b></p> <ol style="list-style-type: none"> <li>1. When press  key, <b>Month</b> blinks, then press  and <b>Date</b> blinks, then press  and <b>Year</b> blinks. When the number blinks, press  key or  key to adjust date, then press  to confirm.</li> <li>2. After confirm the above parameters (the numbers stop blinking), press  key to enter in P3.5 mode or press  key to return to the measurement mode.</li> </ol>

	<p><b>P3.5. – Adjust time</b></p> <ol style="list-style-type: none"> <li>1. When press  key, <b>Hour</b> blinks, then press  and <b>Minute</b> blinks. When the number blinks, press  key and  key to adjust time, then press  to confirm.</li> <li>2. After confirm date, press  key to enter in P3.6 mode or press  key to return to the measurement mode.</li> </ol>
	<p><b>P3.6. – Clear all storage value (No—Yes)</b></p> <ol style="list-style-type: none"> <li>1. When press  key, <b>No</b> blinks, then press  key to select No—Yes, press  key to confirm. No: not delete, Yes: Delete.</li> <li>2. After confirm the parameter, press  key to enter in mode P3.7 or press  key to return to the measurement mode.</li> </ol>
	<p><b>P3.7 – Automatic power-off setup (10→20→30→On)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>On</b> blinks, press  key to select 10→20→30→On, press  key to confirm. On – turn off automatic power-off, Time unit is minutes.</li> <li>2. After confirm the parameter, press  key to enter P3.8 or press  key to return to the measurement mode.</li> </ol>
	<p><b>P3.8 – Set automatic lock-up function (Off→On)</b></p> <ol style="list-style-type: none"> <li>1. Press  key, <b>OFF</b> blinks, then press  key to select OFF→On, press  key to confirm. Off: not set, On: set (the reading is automatically locked when stabilizes &gt; 10 seconds.)</li> <li>2. After confirm the parameter, press  key to enter measurement mode.</li> </ol>



### 8.1 Software Requirement

The meter uses “PC-Link” software connected to via USB port. The recommended requirement for the computer are: 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.

### 8.2 Software Interface

Software interface: see Diagram-15.

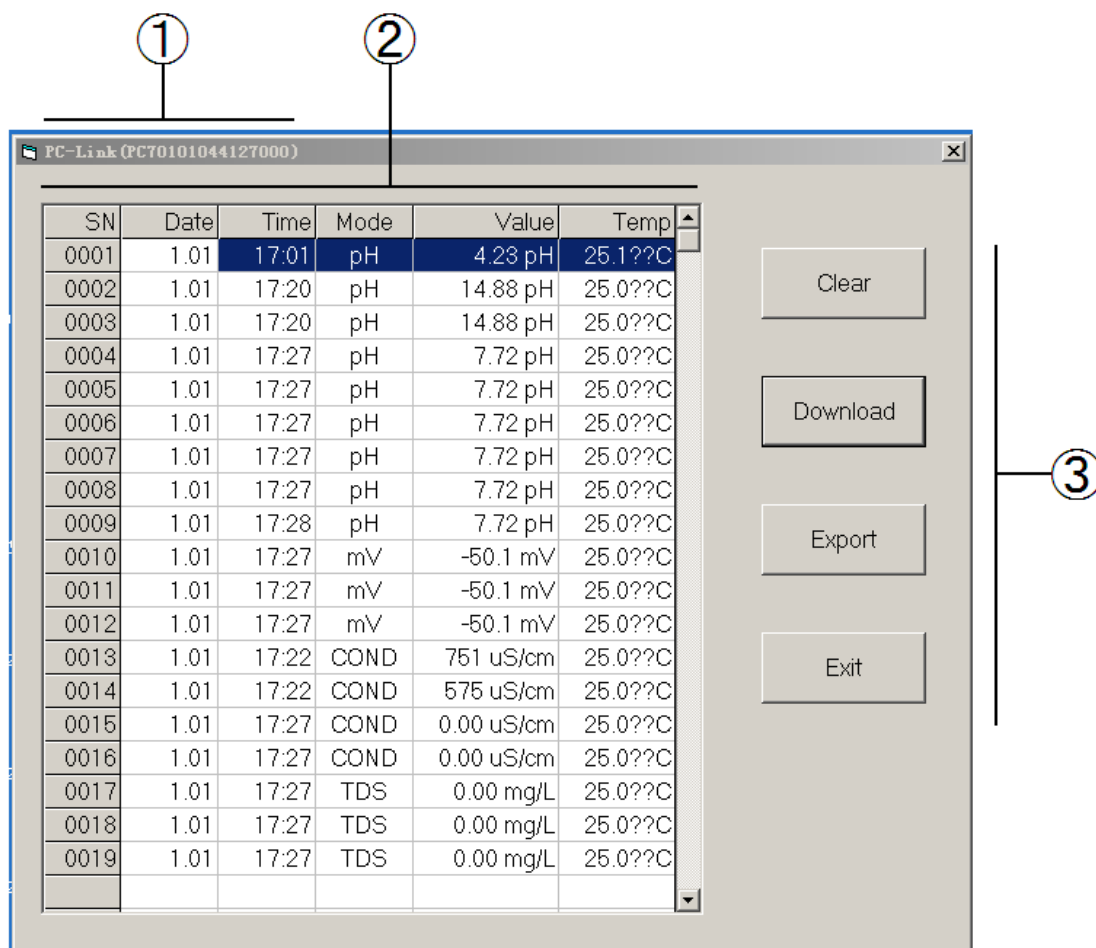


Diagram -15

- ① — Meter serial number
- ② — Stored value
- ③ — Keys

Clear — press this key to clear the data

Download — press this key to download the data from the meter to the computer

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

### 8.3 Install Software

Please follow the steps as below to load PC-Link to the computer:

Open “PC-Link” file→double click “Setup” program → click “OK”→ click icons (see Diagram – 16) → click “Continue”→ click “Confirm”.

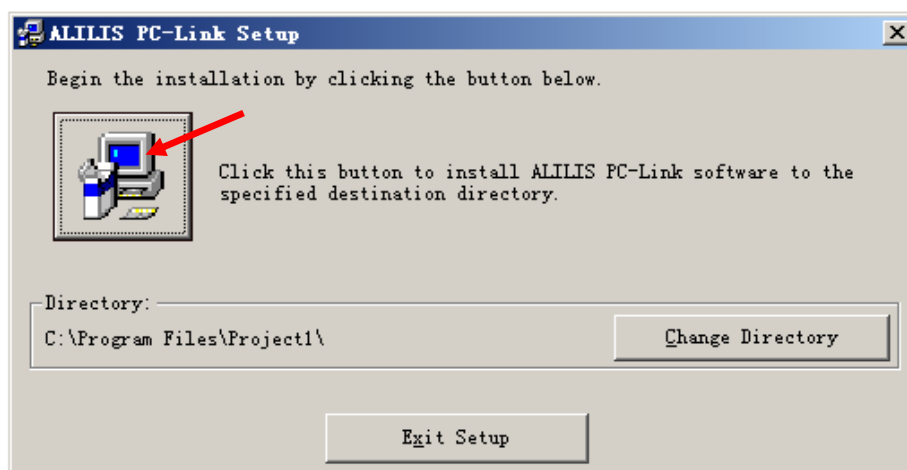



Diagram – 16

#### 8.4. Automatic Connection Port

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

#### Note:

**To reconnect after turn-off, please restart the software interface, as the computer cannot recognize the software automatically.**


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

#### 8.5. Operation Software

##### 8.5.1. Upload the stored value

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

##### 8.5.2. Real-time storage.

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.

##### 8.5.3. Data processing

Press Export key to export the stored value to Microsoft Excel file, to analyze or print the stored data.

#### 9. Meter Kits

No.	Include	Quantity	PH8500	EC8500	PC8500

1	PH8500 portable pH meter	1 set	✓		
2	EC8500 portable conductivity meter	1 set		✓	
3	PC8500 portable pH/conductivity meter	1 set			✓
4	201T-F plastic three-in-on pH electrode	1 pc	✓		✓
5	2301T-S plastic conductivity electrode	1 pc		✓	✓
6	pH standard buffer solution (4.00/7.00pH/50mL)	1 bottle each	✓		✓
7	Conductivity calibration solution (1413 $\mu$ S/cm/12.88mS/50mL)	1 bottle each		✓	✓
8	PC-Link communication software disk	1 pc	✓	✓	✓
9	USB communication cable	1 pc	✓	✓	✓
10	Combined electrode clip	1 pc			✓
11	Portable case	1 pc	✓	✓	✓
12	Manual	1 book	✓	✓	✓

## 10. Warranty

We warrant this instrument to be free from defects in material and workmanship and agrees to repair or replace free of charge, at option of APERA INSTRUMENTS (Europe) GmbH, any malfunctioned or damaged product attributable to responsibility of APERA INSTRUMENTS (Europe) GmbH for a period of three years from the delivery (a six-month limited warranty applies to probes). This warranty does not apply to defects resulting from actions such as misuse (violation of the instructions in this manual or operations in the manner not specified in this manual), improper maintenance, or unauthorized repairs. Warranty period is the time limit to provide free service for the products purchased by customers, not the service life of the instruments or electrodes.

### Appendix I: Parameter setting and factory default setting

Modes	Prompts	Parameter setting items	Abbreviation	Description	Restore to factory default setting
	P1.1	Select pH buffer solution	buF	USA—NIST—CUS	USA
	P1.2	Select resolution	rES	0.01—0.1	0.01

P1.0 pH	P1.3	Set reading stability criteria	SC	Normal—High—Low	Normal
	P1.4	Set due calibration	dc	No—H00—D00	No
	P1.5	Check the date of the last calibration	/	—	—
	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	Standard—CUS	Standard
	P2.3	Select reference temperature	tREF	(15~30)°C	25°C
	P2.4	Adjust temperature compensation coefficient	tCC	0.00~9.99	2.00
	P2.5	Adjust TDS factor	tDS	0.40~1.00	0.71
	P2.6	Set due calibration	dc	No—H00—D00	No
	P2.7	Check the date of the last calibration	/	—	—
	P2.8	Restore factory default setting	FS	No—Yes	No
P3.0 Basic parameters	P3.1	Select temperature unit	/	°C - °F	°C
	P3.2	Select back light timing	BL	1—2—3—On	1
	P3.3	Adjust storage timing	/	—	0:00
	P3.4	Adjust date	/	—	—
	P3.5	Adjust time	/	—	—
	P3.6	Clear stored data	CLR	No—Yes	No
	P3.7	Automatic Power-off setup	AC	10—20—30—On	20
	P3.8	Auto. Hold	/	Off—On	Off


#### 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	rES	Resolution	Resolution
	P1.3	SC	Stability criteria	Reading stability

	P1.4	dC	Due Calibration	Remind due calibration
	P1.5	/	/	/
	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	tREF	Reference temperature	Reference temperature
	P2.4	tCC	Temperature compensation coefficient	Temperature compensation coefficient
	P2.5	tDS	Total Dissolved Solid	TDS
	P2.6	dC	Due Calibration	Remind due calibration
	P2.7	/	/	/
	P2.8	FS	Factory default setting	Factory default setting
P3.0 Basic parameters	P3.1	/	/	/
	P3.2	bL	Back light	Back light
	P3.3	/	/	/
	P3.4	/	/	/
	P3.5	/	/	/
	P3.6	CLr	Clear readings	Clear readings
	P3.7	AC	Auto. close	Auto. close
	P3.8	/	/	/

### Appendix III: Self-diagnosis information

Icons	Self-diagnosis information	pH	Conductivity
Er 1	Wrong pH buffer solution or the meter recognition of calibration solution out of range	√	√

Er2	Press  key when measuring value is not stable during calibration.	✓	✓
Er3	During calibration, the measuring value is not stable for $\geq 3$ min.	✓	✓
Er4	pH electrode performance error (zero potential $> \pm 60$ mV or slope $< 75\%$ )	✓	
Er5	Enter in pre-set due calibration to remind due calibration	✓	✓

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