PC910 Benchtop pH/Conductivity Meter

Instruction Manual

PH910 Benchtop pH Meter ☐

EC910 Benchtop Cond. Meter ☐

PC910 Benchtop pH/Cond. Meter ■

RoHS compliant CE ISO 9001: 2015 IP54 WATERPROOF

APERA INSTRUMENTS (Europe) GmbH

www.aperainst.de

1 Introduction

Thank you for purchasing our PC910 Benchtop pH/Conductivity Meter.

Before using this meter, please read this 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.

This meter is a perfect combination with advanced electronic technology, sensor technology and software design, and is the most cost effective benchtop meter which is suitable for pH and conductivity measurement of water solution in laboratory.

1.1 Measuring parameters

Parameter and configuration	PH910	EC910	PC910
pH/mV	√		√
Conductivity/TDS/Salinity		√	√
Temperature	√	√	√
Electrode Stand	√	√	√

1.2 Basic features

- Clear TFT color display
- User-friendly operating navigation by graphics and texts
- Multi language operating system (English, German & Chinese)
- Smiling icon indicates the reading stability, including automatical lock function.
- With built-in microprocessor chip, the meter has intelligent functions such as automatic calibration, automatic temperature compensation, function setting, self-diagnosis and data logger.
- PC910 meter can measure and display pH & conductivity readings simultaneously.

1.3 pH measurement features

- 1~3 point automatic calibration with calibration instruction and automatic check functions.
- Automatically recognize pH buffer solution. 3 series buffer solution selectable: USA series, NIST series and China series, as well as customized solutions.
- Automatically display electrode slope.

1.4 Conductivity measurement features

- 1~ 4 point automatic calibration with calibration instruction and automatic checking functions.
- Automatically recognize conductivity standard solution. 2 series standard solution selectable: USA and CH, as well as customized solution.
- Single-tap switch among conductivity, TDS, and salinity.

2 Specifications

2.1 Technical parameters

	Technical Parameters		Model
pH	Measuring Range	（0.00 ~ 14.00）pH	PH910 PC910
	Resolution	0.1/0.01 pH	
	Accuracy	±0.01 pH ±1 digit	
	Temperature Compensation Range	（0 ~ 100）°C（Auto. or Manual）	
	Calibration point	1~3 points	
mV	Measuring Range	±2000mV	
	Resolution	1mV	
	Accuracy	±0.1% FS ±1 digit	
Cond.	Measuring Range	Conductivity：0~200 mS/cm, divided into five ranges, automatically switch measuring range. （0~19.99）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	EC910 PC910
	Resolution	0.01/0.1/1μS/cm 0.01/0.1 mS/cm	
	Accuracy	±1.0% FS ±1 digit	
	Temperature Compensation Range	（0 ~ 50）°C（Auto. or Manual）	
	Cell constant	0.1 / 1 / 10 cm^{-1}	
Temp.	Measuring Range	0~100 °C	PH910 EC910 PC910
	Resolution	0.1 °C	
	Accuracy	±0.5 °C±1 digit	

2.2 Other technical parameters

Data Storage	100 groups
Storage Content	Number, measuring value and temperature value
Power	DC9V/600mA
Dimension & Weight	Meter：(195×215×100)mm / 0.9kg

3 Configuration

	Description	Quantity	PH910	EC910	PC910
2.1	PH910 pH meter	1	√		
2.2	EC910 conductivity meter	1		√	
2.3	PC910 pH/conductivity meter	1			√
2.4	602 flexible electrode stand	1	√	√	√
2.5	201T-F plastic 3-in-1 combinationpH electrode	1	√		√
2.6	2301T-F conductivity probe (ATC,K=1.0)	1		√	√
2.7	pH buffer solution (4.00/7.00/10.01pH/50ml)	1 bottle each	√		√
2.8	Conductivity standard solution (84μS/1413μS/12.88mS/50mL)	1 bottle each		√	√
2.9	9V power adapter	1	√	√	√
2.10	Instruction manual	1	√	√	√
2.11	Quick manual	1	√	√	√

4 Instrument Description

4.1 LCD display

pH measurement interface

①—pH measurment
②—pH measuring value
③—Temperature measuring value
④—pH electrode slope
⑤—Calibration solution indication icon
⑥—Temperature compensation icon,
MTC-manual temperature compensation
ATC-auto. temperature compensation
⑦—Auto. lock on icon
⑧—Stable reading icon
⑨—Storage icon and number

Conductivity measurement interface

①—Conductivity measurement
②—Conductivity parameter：
1.0—conductivity cell constant
25.0°C—reference temperature
2.00%—temperature compensation coefficient
③—Calibration solution indication icon

TDS measurement interface

①—TDS measurement ②—TDS factor 0.71

Salinity measurement interface

①—Salinity measurment ②—Salinity factor 0.5

pH/Cond. measurement interface

mV measurement interface

4.2 Keypad functions

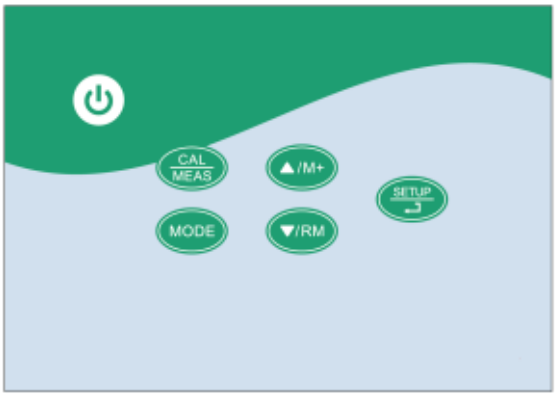


Diagram-1

Keypad operation mode

Short press—Press the <2s, buzzer makes a beep;

Long press—Press key >2s, buzzer makes a beep when pressing the button, another beep will ring after holding the key for 2 seconds.

Chart -1 Keypad operations and functions

Keypad	Operations	Functions
⏻	Short press	● Power on/off
MODE	Short press	Press key to select measurement mode: ● PH910: pH→mV ● EC910: Cond→TDS→Salt ● PC910: pH→mV→Cond→TDS→Salt→pH/Cond
	Long press	● Press key to enter temperature adjustment mode (for manual temperature compensation)
CAL MEAS	Long press	● In measurement mode, press key to enter calibration mode
	Short press	● Cancel operation and return to measurement mode;
SETUP ↵	Short press	● In measurement mode: press key to enter parameter setup main menu; ● In calibration mode: press key to conduct calibration; ● In main menu mode: press key to enter submenu; ● In submenu mode: press key to enter parameter setup; ● In parameter setup mode: press key to confirm parameter change; ● In temperature adjustment mode: press key to confirm temperature value.
▼/RM ▲/M+	Short press	● In measurement mode: press ▲/M+ key to store measuring value, press ▼/RM key to recall; ● In recall(RM) mode: press ▼/RM or ▲/M+ key to turn page; ● In menu mode: press key to select items; ● In temperature adjustment mode: press key to change temperature value, hold key for fast change.

4.3 Meter sockets

①— BNC socket, connect with pH combination electrode and ORP combination electrode.

②— RCA socket, connect with temperature sensor (for pH measurement).

①+②—BNC+RCA socket, connect with pH/ATC 3-in-1 combination electrode.

③— Φ4 banana socket, connect with reference electrode.

④— BNC socket, connect with conductivity cell.

⑤— RCA socket, connect with temperature sensor (for conductivity measurement).

④+⑤— BNC+RCA socket, connect with Cond/ATC cell.

⑥— Φ2.5 power socket (inside "＋" outside "－") connect with DC9V adapter.

Model	Meter sockets
PH910	① ② ③ ⑥
EC910	④ ⑤ ⑥
PC910	① ② ③ ④ ⑤ ⑥

4.4 Display mode

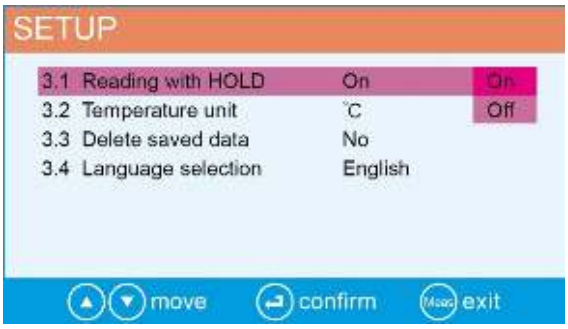
4.4.1 Reading stable display mode

When the measuring value is stable, smiley icon ☺ appears and stays on LCD screen, see Diagram – 3. If the smiley icon does not appear or flash, please do not get readings or make calibration until the measuring value is stable.

Diagram-3

4.4.2 Auto. lock on display mode

In parameter setting 3.1, set "Reading with HOLD" to "ON", when ☺ icon stably display for more than 10 seconds, the meter will lock the value automatically and display **HOLD** icon, see Diagram – 4(b). In **HOLD** mode, press CAL MEAS key to cancel auto lock.



(a) (b)

Diagram-4

4.5 Data storage, recall and delete

4.5.1 Storage

Press ▲/M+ key to store, icon 12 displays on the top right corner of LCD screen which means it's the 12th group data, see Diagram – 5(a); Each meter can store 100 groups data. For single parameter display mode, 1 serial number corresponds to 1 group measuring vale. For dual parameter display mode (means pH+Cond. meter display mode), 1 serial number corresponds to 2 groups measuring value (pH + conductivity). So for this type of meter, actual store data is 100 groups, but storage number will be less than 100. If press ▲/M+ key again when storage value is full, icon Full will flash, see Diagram – 5(c) to indicate store memory is already full and need to be deleted for new store value.

4.5.2 Recall

Press ▼/RM key, meter will display stored 12 groups measuring value, see Diagram – 5(b), press ▲/M+ or ▼/RM key to turn page. Every page displays 8 groups data.

4.5.3 Delete

Data need to be deleted when storage memory is full, otherwise no more data can be stored. In parameter setting 3.3 select "Yes" and press SETUP key, see Diagram – 5(d) to delete all stored value.

(a) (b)

(c) (d)

Diagram-5

4.6 Manual adjust temperature

In MTC mode, long press MODE key to enter temperature regulation mode. Press ▲/M+ or ▼/RM key to adjust temperature value. Press and hold the key for fast adjustment. Press SETUP key to confirm and return to measurement mode.

5 pH measurement

5.1 pH Electrode Information

The meter comes with a 201T-F 3-in-1 combination electrode with a built-in temperature sensor, which enables the automatic temperature compensation. This pH electrode is only suitable for general water solutions – medium to high ion concentration, non-protein solution, non-strong acid or alkali, at moderate temperature — of which common applications are in hydroponics, pools and spas, aquaculture, environmental monitoring, water treatment, cooling towers, education, etc.

For testing pH of special samples such as viscous (sticky), strong acidic or alkaline solutions, solutions at high or low temperature (>50˚C or <10˚C), solid samples, turbid solutions, low ion-concentration solutions & etc…specialized pH electrodes are necessary in order to achieve reliable results. Regular pH electrodes in these special applications usually would generate inaccurate and unstable measurements, and may be damaged by the samples, or even be non-applicable for testing at all.

Please refer to Section 9 for ideal pH electrodes to use for other specific applications.

5.1.1 Technical Specifications of the 201T-F pH Electrode

Measurement Range: 0 - 14 pH, 0 - 80˚C (32 – 176˚F)
Junction: Single Ceramic
Reference Electrode: Ag/AgCl
Connector: BNC/RCA
Size: ø12*160 mm
Temperature unit: 30K Thermistor

5.1.2 Electrode Connectors

The pH electrode has two connectors: the BNC connector connects the pH probe; the RCA connector connects the temperature sensor. Plug these two connectors into ‘pH/mV” and “TEMP” sockets. Please note not to pull the cables in case of poor contact. Please keep the connectors clean and dry.

5.1.3 Use the Electrode

Screw off the KCL storage bottle, and put it aside (do not dump or spill the KCL solution). Prepare a cup of distilled water, and rinse the electrode in it for a few seconds. Gently shake the probe to remove excess water, and dry it with clean tissue paper (DO NOT rub or wipe the probe, just use paper to dap off excess water). Gently stir the electrode for a few seconds after it’s fully submerged into the test solution and then let it stand still. Wait for the stable measurement (a smiley face appears and stays) and then record the readings. When test is finished, rinse the probe in purified water and place the electrode in the storage bottle and tighten the cap.

5.2 pH calibration related information

5.2.1 Standard buffer solution

The instrument adopts three series standard buffer solution, USA, NIST and CH series, and also customized solution. Please see Chart – 2 for the three series of standard buffer solution. The detail of customized solution, see clause 7.3.

Chart -2 pH standard buffer solution series

Calibration indication icons		pH standard buffer solution series		
		USA series	NIST series	CH series
Three-point calibration	4.00	4.00 pH	4.01 pH	4.00 pH
	7.00	7.00 pH	6.86 pH	6.86 pH
	10.01	10.01 pH	9.18 pH	9.18 pH

Note: calibration indication icons are example of USA series.

5.2.2 Three-point calibration

The instrument can perform 1~3 point calibration. In three-point calibration mode, 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 – 3.

Chart -3 Three-point calibration mode

	USA standard	NIST standard	CH standard	Calibration indication icons	Applicable range
One-point calibration	7.00 pH	6.86 pH	6.86 pH	7.00	Accuracy ≤±0.1pH
Two-point calibration	7.00 pH and 4.00pH	6.86 pH and 4.01pH	6.86 pH and 4.00pH	4.00 7.00	<7.00 pH
	7.00 pH and 10.01pH	6.86 pH and 9.18pH	6.86 pH and 9.18pH	7.00 10.01	>7.00 pH
Three-point calibration	7.00pH, 4.00pH and 10.01 pH	6.86pH, 4.01pH and 9.18 pH	6.86pH, 4.00pH and 9.18 pH	4.00 7.00 10.01	0~14.00pH

Note: calibration indication icons are example of USA series.

5.2.3 *Calibration information display*

	1. Automatically display electrode slope in measurement interface ● Display average slope after two or three point calibration ● Dose not display slope after one point calibration
	2. Display last calibration data in pH submenu clause 1.3

5.2.4 *Calibration frequency*

The frequency that you need to calibrate your meter depends on the tested samples, condition of electrodes, and the requirement of the accuracy. For High-Accuracy meaustements (≤ ±0.02pH), the meter should be calibrated before test every time; For ordinary-accuracy measurements (≥±0.1pH), once calibrated, the meter can be used for about a week or longer. In the following cases, the meter must be re-calibrated:

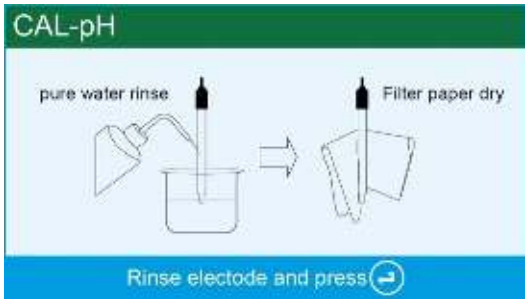
a) The electrode hasn't been used for a long time or a new electrode is connected.

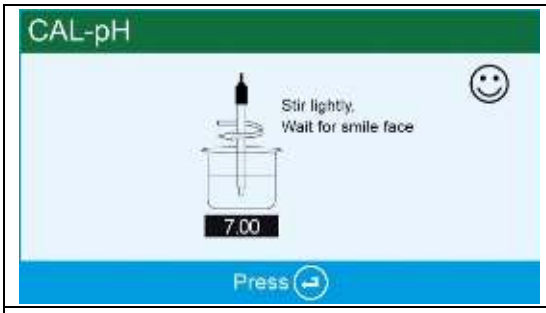
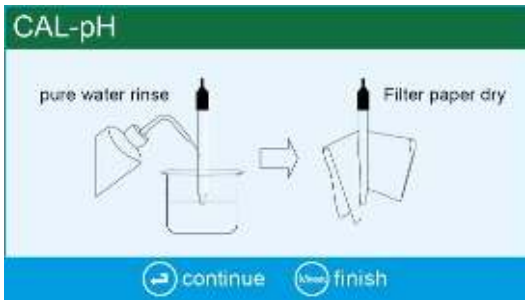
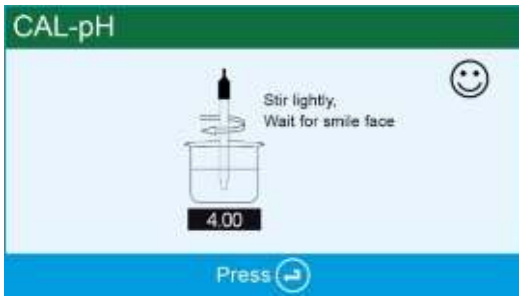
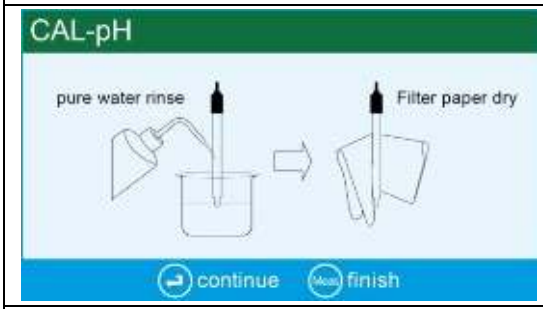
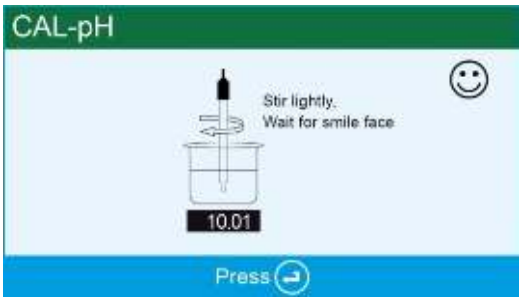
b) After measuring strong acid (pH<2) or strong base (pH>12) solutions.

c) After measuring fluoride-containing solution and strong organic solution

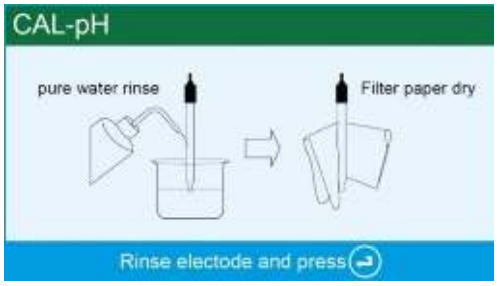
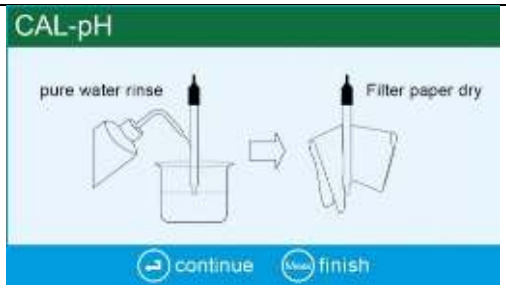
d) There is a significant difference between the temperature of the test sample and the temperature of the buffer solution that is used in the last calibration.

5.3 pH meter calibration (take three-point calibration as an example)

	Long press CAL MEAS key to enter calibration mode, as shown in left graph. Rinse pH probe in purified water, remove excess water by shaking or filter paper. Press SETUP key to confirm.

	Submerge probe in pH7.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press SETUP key to finish calibration.
	Rinse pH probe in purified water, allow it to dry by shaking or filter paper. Press SETUP key to confirm. If only need one point calibration, press CAL MEAS key to return to measurement mode.
	Submerge probe in pH4.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press SETUP key to finish calibration.
	Rinse pH probe in purified water, remove excess water by shaking or filter paper. Press SETUP key to confirm. If only need two point calibration, press CAL MEAS key to return to measurement mode.
	Submerge probe in pH10.01 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press SETUP key to finish calibration.
	Calibration completed, instrument goes back to measurement mode.

5.4 Customized calibration (take 2.00pH and 7.30pH calibration solution as an example)

	1. Select User in parameter setting 1.1, press CAL MEAS key to return to measurement mode.
	2. Long press CAL MEAS key to enter calibration mode, as shown in left graph. Rinse pH probe in purified water, remove excess water by shaking or filter paper. Press SETUP key to confirm.
	3. Submerge probe in pH2.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press ▲/M+ or ▼/RM key to adjust measuring value to 2.00pH. Press SETUP key to finish calibration.
	4. Rinse pH probe in purified water, remove excess water by shaking or filter paper. Press SETUP key to confirm. If only need one point calibration, press CAL MEAS key to return to measurement mode.
	5. Submerge probe in pH7.30 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press ▲/M+ or ▼/RM key to adjust measuring value to 7.30pH. Press SETUP key to finish calibration.
	6.Calibration completed, instrument goes back to measurement mode.

Notes:

(a) The meter can perform 1-2 point customized calibration. When the 1st point calibration is done, press CAL MEAS key, the meter exits from calibration mode. This is one-point customized calibration.

(b) The meter does not have the function to recognize customized calibration solution. But it requires the error of customized calibration solution ≤1pH, the difference between two calibration solution ≥1pH, otherwise the meter will display self-diagnostic error.

(c) The pH value of customized solution is a value in a certain fixed temperature. The meter has to perform calibration and measurement at the same temperature to avoid error.

(d) In manual temperature compensation mode, the temperature value should be adjusted before calibration. It can not be adjusted during calibration process.

5.5 Self-diagnosis Information

During the process of calibration and measurement, the meter has self-diagnosis functions, see chart – 4. Diagram-6 for detailed information.

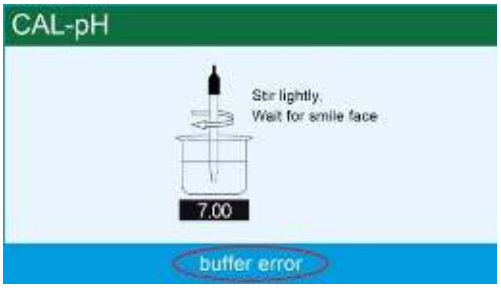


Diagram-6

Chart -4 Self-diagnostic information of pH measurement mode

Self-diagnostic information	Description	Check up
buffer error	Wrong pH buffer solution or exceed the recognition range of the meters	1.Check if the pH buffer solution is correct 2. Check if the connection between meter and probe is good 3. Check if the probe is failed
no stable	Press SETUP key when measuring value is not stable.	Press SETUP when ☺ icon appears
electrode error	The measuring value is not stable for long time (≥3min)	1.Check the probe bulb and make sure there is no air bulb in it 2.Replace the pH probe with a new one

Note: “electrode error” also includes the situation where electrodes get aged or worn out.

5.6 Sample measurement

5.5.1 Rinse pH probe in purified water, allow it to dry, and submerge it in tested solution. Stir the solution briefly and allow it to stay in the tested solution until ☺ icon appears on LCD and a stable reading is reached. The reading is the pH value of tested solution. Diagram–7 is the calibration and measurement process of pH meter.

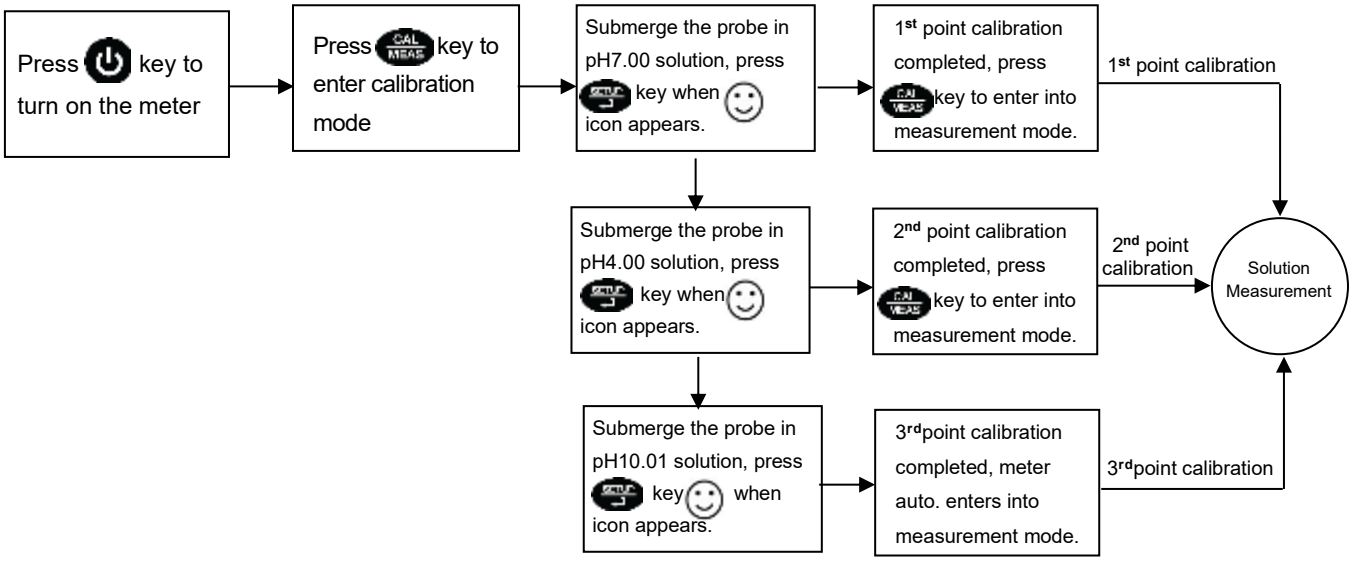


Diagram-7

5.5.2 pH isothermal measurement principle

The closer the temperature of the sample solution to the calibration solution, the more accurate the measurements will be. Please be aware of this principle.

5.5.3 Restore to factory default setting

Instrument has a factory default setting function, please refer to parameter setting clause 1.4 (see Diagram-8). With this function, all calibration data is deleted and the meter will be calibrated to the theory value (pH value of zero electric potential is 7.00, the slope is 100%). Some function settings restore to the original value (refer to clause 7.2). When calibration or measurement fails, please restore the meter to factory default setting and then perform re-calibration or measurement. Please note that all the data deleted will not be retrievable if the meter is restored to factory default setting.

Diagram-8

5.7 pH electrode maintenance

5.7.1 Daily maintenance

The soaking solution contained in the supplied protective bottle is used to maintain the sensitity of the electrode. Loosen the cap, take out the electrode and rinse in distilled or water before taking a measurement. Insert the electrode and tighten the cap after measurements to prevent the solution from leaking. If the soaking solution is cloudy or moldy, replace the 3M KCL solution.

*** We DO NOT recommend using other brand's soaking solution, since different chemicals can be used and potential damage can be caused to the electrode**)

* The electrode should **NOT** be stored in **purified or distilled** water, protein solution, acid fluoride solution, or organic lipids. Distilled water or purified water is only recommended for rinsing electrodes.

5.7.2 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. We recommend 10-15 times of use before replacing the pH buffers (pH10.01 should be replaced more often since it's easier to get contaminated).

5.7.3 Protect the electrode

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, the electrode should be rinsed with distilled water or purified water. If a sample sticks to the electrode or it's contaminated, the electrode should be thoroughly cleaned using a soft brush with soap water and then rinsed with distilled water. After that, soak it in the KCL solution again for at least 6 hours.

6 ORP Measurement

6.1 ORP measurement

Press MODE key, and switch the meter to mV measurement mode. Connect ORP probe (need to purchase it separately) and dip it in sample solution, stir the solution briefly and allow it to stay in the solution until ☺ icon appears. The reading obtained is ORP value.ORP stands for Oxidation Reduction Potential. It means oxidation-reduction potential of solution.

ORP is the measurement index for the oxidation-reduction ability of water solution. Its unit is mV.

6.2 Notes for ORP measurement

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

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

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

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

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

6.3 Ion potential measurement

Connect ion probe and dip it in sample solution, stir the solution briefly and allow it to stay in the solution until ☺ icon appears and stays. The reading obtained is potential value of ion probe. If ion probe is combination type, only need to insert it into "pH/mV" socket. If it's not combination type, proper reference electrode should be selected and insert it to "REF" socket. Two probles should be used at the same time.

7 Conductivity Measurement

7.1 Conductivity probe information

7.1.1 Using conductivity probe

The meter includes one plastic conductivity probe (Model 2301T-F, K=1.0). With built-in temperature sensor, the meter can realize automatic temperature compensation. BNC plug of the probe is connected to the meter's conductivity socket while RCA plug is connected to the Temp socket. When the probe is submerged in solution, stir the solution briefly to eliminate the air bubbles and in this way, a stable measurement will be reached fast.

For other conductivity electrodes testing low or high range solutions, please refer to section 10.

7.1.2 Conductivity probe constant

The meter can use with conductivity probes with three constants (K=0.1, K=1.0 and K=10.0). Please refer to chart-5 for the measuring range. Instrument constant can be set in parameter setting clause 2.1.

Chart -5 Probe constant and measuring range

Measuring Range	＜20 μS/cm	0.5μS/cm~100mS/cm			＞100mS/cm
Conductivity probe constant	K=0.1 cm^{-1}	K=1.0 cm^{-1}			K=10 cm^{-1}
Standard solution	84μS/cm	84μS/cm	1413 μS/cm	12.88 mS/cm	111.8 mS/cm

7.2 Conductivity calibration related information

7.2.1 Conductivity calibration solutions

The meter uses Standard series and CH series conductivity solution. The meter can recognize the standard solution automatically and perform 1~4 point calibration. The calibration icons at the bottom left of LCD screen is corresponding to four built-in standard values. See chart – 6:

Chart -6 Conductivity standard solution series

Icons	Standard calibration solution	CH conductivity solution
84	84 μS/cm	146.6μS/cm
1413	1413 μS/cm	1408μS/cm
12.88	12.88 mS/cm	12.85mS/cm
111.8	111.8 mS/cm	111.3mS/cm

Note: calibration indication icons are examples of Standard series.

7.2.2 Calibration frequency

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

(b) Normally, performing calibration once a month is recommended.

(c) For high accuracy measurement or larger temperature deviation from the reference temperature

(25°C), performing calibration once a week is recommended.

(d) Use conductivity standard solution to check the probe. Perform calibration if the error is significant.

(e) When using a new probe for the first time, or the meter has restored to factory default setting, 3-point or 4-point calibration is recommended. For everyday use, standard solution closer to the sample solution can be chosen to perform 1- point or 2-point calibration. For example: 1413 μS/cm standard solution is suitable for measuring range 0-20mS/cm.

7.2.3 Reference temperature

Factory set reference temperature is 25°C. Other reference temperature can also be set within the range 15°C~30°C. Set up reference temperature in parameter setting clause 2.4

7.2.4 Temperature coefficient

Factory set temperature compensation coefficient of the meter is 2.0%. However, the conductivity temperature coefficient is different from that of varous kinds of solution and concentration. Please refer to chart – 7 and the data collected during testing and set up the parameter in clause 2.5.

Note: When the temperature compensation coefficient is set to 0.00 , it means there is no temperature compensation. The measurment value will be based on the current temperature.

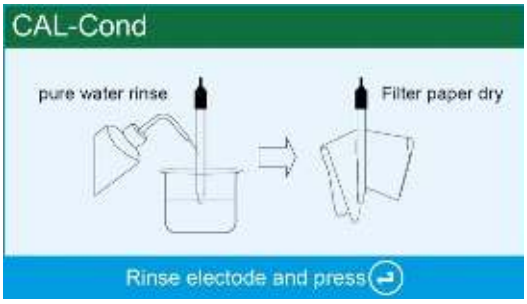
Chart -7 Temperature compensation coefficient of certain solutions

Solution	Temperature compensation coefficient
NaCl 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

7.2.5 Avoid contamination of standard solutions

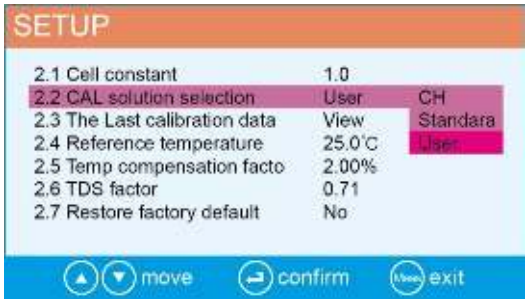
Conductivity standard solution has no buffer. Please avoid contamination during usage. Before submerging the probe in standard solution, please rinse the probe with purified water and remove excess water with clean tissue. Please do not use the same cup of conductivity standard solution frequently, especially for standard solution of low concentration 84μS/cm. The contaminated standard solution will affect accuracy of measurements.

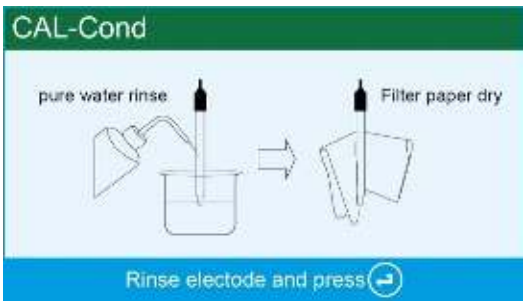
7.3 Conductivity meter calibration (take 1413μS/cm calibration as an example)

	1. Long press CAL MEAS key to enter calibration mode, as shown in left graph. Rinse pH probe in purified water, remove excess water by shaking or filter paper. Press SETUP key to confirm.
	2. Submerge probe in 1413μS/cm solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press SETUP key to finish calibration.
	3. Calibration completed, instrument goes back to measurement mode.

- For mulit-point calibration, please repeat above 1~3 step until all the calibration is done. The meter can perform calibration in same calibration solution until the value displayed is stable and repeatable.
- To quit calibration mode, please CAL MEAS key, meter will return to measurement mode.
- Press MODE key to switch measurement mode **Cond→TDS→Salt.**

7.4 Customized calibration (take 10μS/cm standard solution as an example)

	1. Select User in parameter setting clause 2.2, press CAL MEAS key to return to measurement mode.

	2. Long press CAL MEAS key to enter calibration mode, as shown in left graph. Rinse probe in purified water, remove excess water by shaking or filter paper. Press SETUP key to confirm.
	3. Submerge probe in 10μS/cm standard solution. Stir the solution briefly and allow it to stay in the buffer solution until ☺ appears and stays. Press ▲/M+ or ▼/RM key to adjust measuring value to10.00μS/cm. Press SETUP key to finish calibration.
	Calibration completed, instrument goes back to measurement mode.

- Only 1-point calibration for customized calibration. The conductivity value of customized solution is a value in a certain fixed temperature. There is no regulation of temperature coefficient or reference temperature. Calibration and measurement must be performed at the same temperature to avoid significant error.
- The meter does not have the function to recognize customized calibration solution.
- In manual temperature compensation mode, the temperature value should be adjusted before conducting calibration. It can not be adjusted during calibrating process.

7.5 Self-diagnosis information

During the process of calibration, the meter has self-diagnosis functions, see chart – 8 for detailed information.

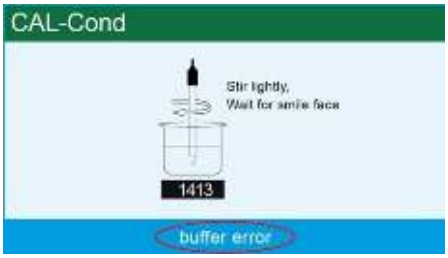


Diagram-9

Chart -8 Self-diagnostic information of conductivity measurement mode

Self-diagnostic information	Description	Check up
buffer error	Wrong conductivity calibration solution or exceed recognition range of the meter	1. Check if conductivity solution is correct. 2. Check if the connection between meter and probe is good 3. Check if the probe is failed
no stable	Press SETUP key when measuring value is not stable.	Press SETUP when ☺ icon appears
electrode error	The measuring value is not stable for long time (≥3min)	1. Shake the probe to eliminate bubbles in probe head. 2. Replace conductivity probe with a new one

Note: “electrode error” also includes the situation where electrodes get aged or worn out.

7.6 Solution measurement

7.6.1 Rinse conductivity probe in purified 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 and stays on LCD screen. The reading is the conductivity value of the solution.

Diagram – 10 is the calibration and measurement process of conductivity.

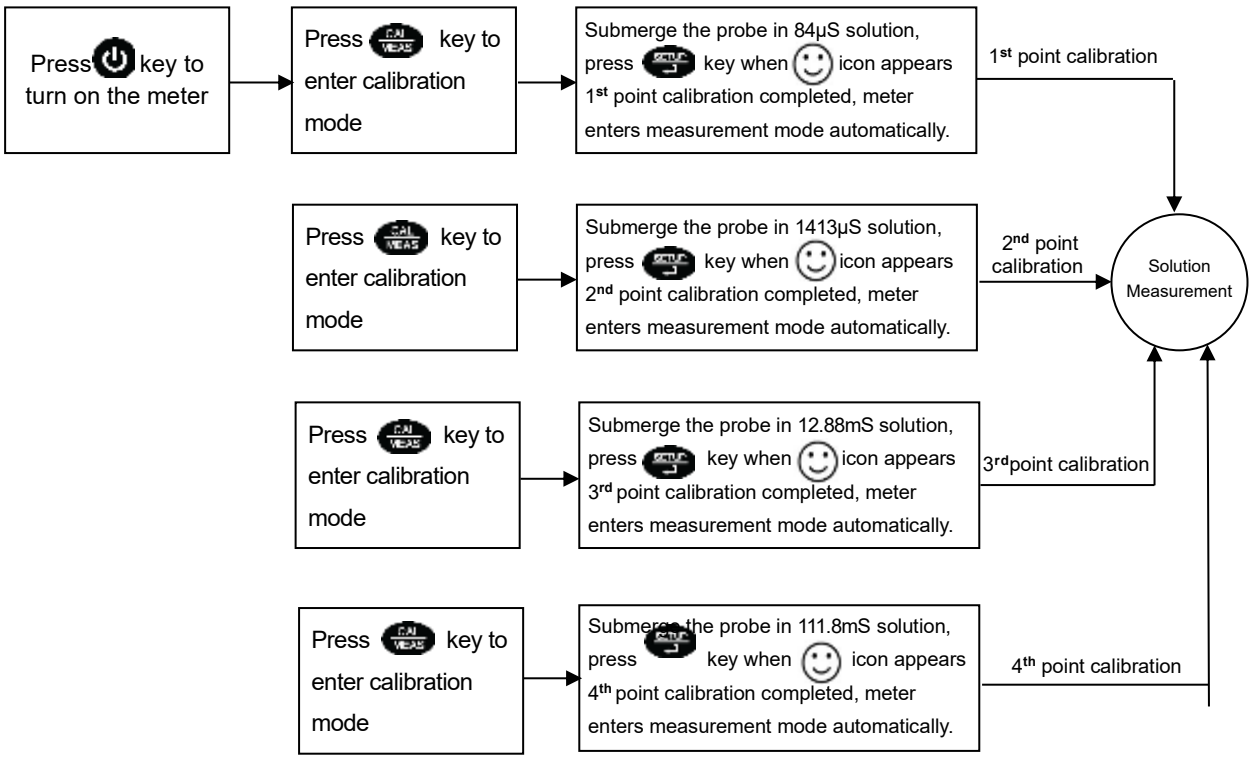


Diagram-10

7.6.2 Relationship among TDS, salinity and conductivity

The conversion coefficient between TDS and conductivity is 0.40~1.00 which can be adjusted in parameter setting clause 2.6. Factory default setting is 0.71. The conversion coefficient between salinity and conductivity is 0.5. So the meter only needs to be calibrated in conductivity mode, then switch to TDS and salinity mode. Customers can adjust TDS conversion coefficient in parameter setting 2.6 according to testing data and experience. Please refer to chart-9 for some frequently-used conductivity and TDS conversion coefficients.

Chart -9 Conversion coefficient between conductivity and TDS

Conductivity of solution	TDS conversion coefficient
0~100 μS/cm	0.60
100~1000 μS/cm	0.71
1~10 mS/cm	0.81
10~100 mS/cm	0.94

7.6.3 Restore to factory default setting

Instrument has a factory default setting function, please refer to parameter setting clause 2.7 (see Diagram-11).With this function, all calibration data is deleted and the meter will be calibrated to the theory value. Some function settings restore to the original value (refer to clause 2.7). When calibration or measurement fails, please restore the meter to factory default setting and then perform re-calibration or measurement. Please note all the data deleted will not be retrievable if the meter is restored to factory default setting.

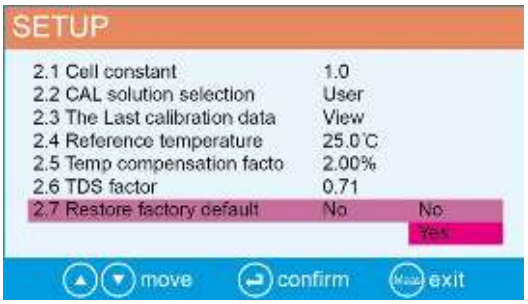


Diagram-11

7.7 Conductivity probe maintenance

7.7.1 Always keep the conductivity probe clean. Before taking a measurement, rinse the probe in purified water and allow it dry, then rinse it in the sample solution. When submerge the probe in solution, stir the solution briefly to eliminate air bubbles and allow it to stay in the solution until a stable reading is reached.

7.7.2 The sensitive rod of Model 2301T-F conductivity probe is coated with platinum black to minimize probe polarization and expand measuring range. The platinum black coating of the probe adopts advanced electroplating technology. This not only increases the surface roughness, but also improves probe measurement performance. And the coating is tight and firm, it can be washed by a soft brush. This significantly increases the the service life of probe.

8 Parameter setting

8.1 Main menu and submenu

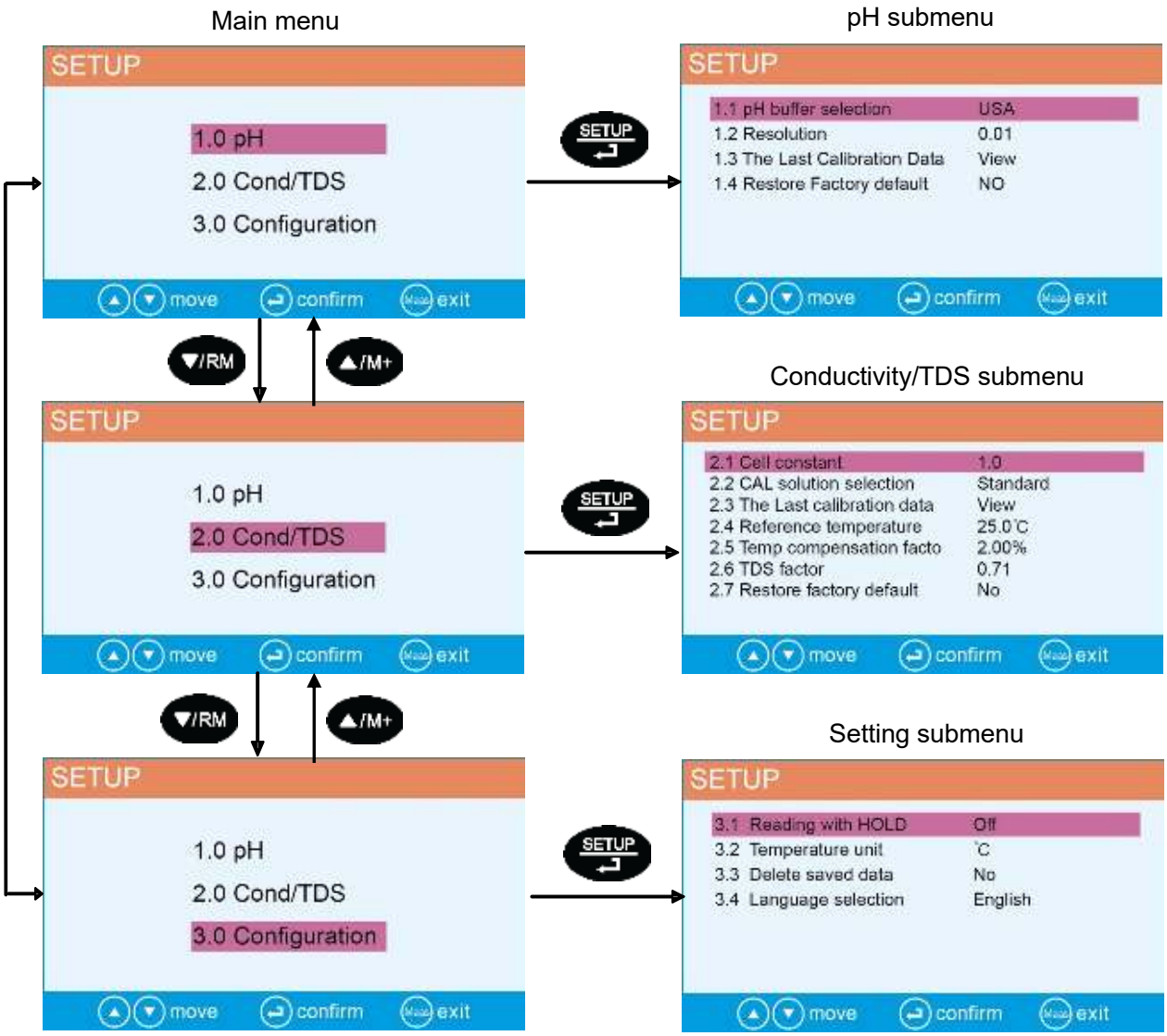


Diagram-12

8.2 Operation

Press SETUP key to open main menu→press ▲/M+ or ▼/RM key to select main menu items→press SETUP key to open main menu item (submenu)→press ▲/M+ or ▼/RM key to select submenu items(parameter)→ press SETUP key to open parameter→press ▲/M+ or ▼/RM key to select parameter items or parameter value→press SETUP key to confirm→press CAL MEAS key to return to measurement mode.

Please follow the operating indication in the bottom of LCD screen when operate it.

8.3 Content of parameter setting

Main menu	Serial number	Parameter setting items	Setting content	Factory default
1.0 pH	1.1	pH buffer selection	CH-USA-NIST-User	USA
	1.2	Resolution	0.01-0.1	0.01
	1.3	The last calibration data	View	/
	1.4	Restore factory default	No-Yes	No
2.0 Cond./TDS	2.1	Cell constant	10-1.0-0.1	1.0
	2.2	CAL solution selection	CH-Standard-User	Standard
	2.3	The last calibration data	View	/
	2.4	Reference temperature	15 ~ 30°C	25°C
	2.5	Temp compensation factor	0.00~10.00%	2.0%
	2.6	TDS factor	0.40~1.00	0.71
	2.7	Restore factory default	No-Yes	No
3.0 Configuration	3.1	Reading with HOLD	On-Off	/
	3.2	Temperature unit	°C - °F	°C
	3.3	Delete saved data	Yes/No	/
	3.4	Language selection	中文-English-Deutsch	/

9 Recommended pH Electrodes for Specific Applications

Application	Ideal Apera pH Electrodes to Use
General water solutions	201T-F, LabSen 213, LabSen 211
Beverage, beer, or wine analysis	LabSen 213, LabSen 211
Cosmetics	LabSen 851-1
Dairy products (milk, cream, yogurt, mayo, etc.)	LabSen 823
High-Temperature liquid	LabSen 213
Low-temperature liquid	LabSen881
Meat	LabSen 763
Micro sample testing	LabSen 241-6, LabSen 241-3
Purified Water (Low ion concentration samples)	LabSen 803, LabSen 813
Soil	LabSen 553
Solid or semi-solid samples (cheese, rice, fruit, etc.)	LabSen 753
Strong acid samples	LabSen 831
Strong alkalined samples	LabSen 841
Surface test (skin, paper, carpet, etc.)	LabSen 371
Titration	LabSen 223
TRIS buffer solutions	LabSen 213, LabSen 223
Viscous liquid samples	LabSen 223, LabSen851-1
Wastewater or emulsion	LabSen 333

10 Recommended Conductivity Electrodes for Specific Applications

Application	Ideal Apera pH Electrodes to Use
Medium range (0-200mS/cm), K=1.0	2301T-F, 2301-C
Medium range (0-200mS/cm) & require higher accuracy K=1.0	2401T-F, 2401-C
High range (20-2000mS/cm), K=10	2310T-F, 2310-C
Low range (0 to 200µS/cm) e.g. ultra-purified water, K=0.1	DJS-0.1-C, DJS-0.1-F

*** Visit www.aperainst.de or contact us at 0049-(0)202-51988998 for more help.**

11 Warranty

We warrant this instrument to be free from defects in material and workmanship and agree 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 (SIX MONTHS for the probe) from the delivery.

This limited warranty does not cover any damages due to:
Transportation, storage, improper use, failure to follow the product instructions or to perform any preventive maintenance, modifications, combination or use with any products, materials, processes, systems or other matter not provided or authorized in writing by us, unauthorized repair, normal wear and tear, or external causes such as accidents, abuse, or other actions or events beyond our reasonable control.

Apera Instruments, LLC (U.S.A)
Add: 6656 Busch Blvd,
Columbus Ohio 43229
Tel: +1 614-285-3080
Email: info@aperainst.com
Website: www.aperainst.com

Apera Instruments (Europe) GmbH
Wilhelm-Muthmann-Straße. 18
42329 Wuppertal, Germany
Tel: +49(0)202 51988998
Email: info@aperainst.de
Website: www.aperainst.de

Shanghai Apera Instruments
Co, Ltd. (China)
Add: 481GuipingRd Building
#16, 4F, Shanghai China
Tel: +86-21-63362480
Email: sanxin@shsan-xin.com