# Model PH900 pH/mV Meter

# Operation Manual

# 900 Series of Portable Meters

**1. Model PH900 pH / mV Meter**

2. Model CON900 Conductivity / TDS / Salinity / Resistivity Meter

3. Model DO900 DO Meter

4. Model EC900 pH / mV / Conductivity / DO Meter

# Table of Contents

## 1. Brief Introduction:

Thanks for buying and using the model PH900 pH/mV Meter (the following called **"**meter**"** in short).

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

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

Built-in microprocessor chip, beautiful appearance, multi-functional and easy to use, this meter has the following prominent features:

1.1. Built-in microprocessor chip, with the intelligent functions of automatic calibration, automatic temperature compensation, data storage, function setting and automatic self-diagnose, auto power off and low voltage display etc. Equips with calibration solution and special carrying case, easy to use.

1.2. Adopts digital filter and step slipping technology to intelligently improve meter's response speed and result accuracy. **"** ☺ **"** will appear when reading to be stable.

1.3. Automatically recognize 13 kinds of pH standard buffer solution. User can choose anyone from three series of buffer solutions: Europe & U.S.A. series, NIST series, and China series.

1.4. Purified water and ammonia added purified water pH measuring mode can be set up, for this two special pH measuring modes, besides the general slope temperature compensation, also added function of nonlinearity solution temperature compensation to make measurement more accurate, especially suitable for the fields of electric power and petrochemical etc.

1.5. Meter's circuit board adopts SMT film-covering technology to improve meter's production reliability.

1.6. Meter has the back light LCD display monitor.

1.7. Dustproof and waterproof meter meets IP57 rating.

## 2. Technical Parameters:

### 2.1. pH:

| | |
|---|---|
| Measuring range | (-2.00 to 19.99) pH |
| Resolution | 0.1/0.01 pH |
| Accuracy | Meter: ±0.01pH; Complete Kit: ±0.02pH |
| Input current | $\leqslant 2\times10^{-12}$ A |
| Input impendance | $\geqslant 1\times10^{12}$ Ω |
| Stability | ±0.01 pH/3h |
| Temp. Compensation range | (0 to 100) ℃ (automatic) |

### 2.2. mV:

| | |
|---|---|
| Measuring range (mV/ORP/$E_H$) | -1999 mV to 0 to 1999mV |
| Resolution | 1mV |
| Accuracy | Meter: ±0.1% FS |

### 2.3. Other Technical Parameters:

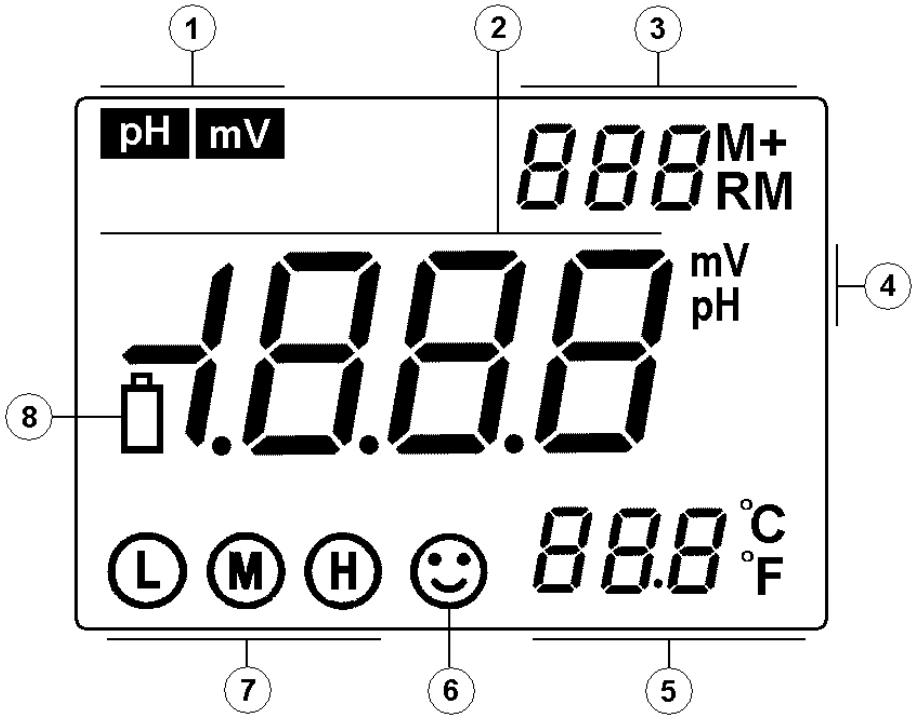
| | |
|---|---|
| Data storage | 200 groups |
| Storage content | Series number, measuring value, measuring unit and temperature |
| Power | Two AA batteries (1.5V x2) |
| Size and weight | Meter: (65×120×31)mm/180g Carrying case:(255 x 210x 50)mm/790g |
| Quality and safety certification | ISO9001:2000, CE and CMC |

### 2.4. Working Condition:

| | |
|---|---|
| Environment temperature | 5 to 35 ℃ (0.01 grade) |
| Environmental humidity | ⩽85% |
| IP rating | IP57 Dustproof and waterproof |

## 3. Instructions to the Meter:

### 3.1. LCD Display:




① —— Parameters mode icon

② —— Measuring value

③ —— Serial number and icon as measuring value to be stored and recalled.

M+ — measuring value to be stored icon;

RM — reading to be recalled icon;

④ —— Measuring unit

⑤ —— Temperature measuring value and unit

⑥ —— Measuring value to be stable icon

⑦ —— Electrode calibration indicate icon

⑧ —— Indication icon of low voltage, appears when the voltage less than 2.4V, call attention to change the batteries.

**3.2. Operation Keys:**

The meter has 5 operation keys in all.

3.2.1. ON/OFF — Switch key

3.2.2. CAL — Calibration key

(a) When in the measurement state, press this key to enter into calibration mode.

(b) When in the parameter setting state, press this key to change the number or the ON/OFF state.

3.2.3. MODE — Function key

(a) Short-time press (time<1.5s) switch the measuring parameters, the meter will display

pH → mV

(b) Depress (time >2s) to enter into the parameter setting mode P1, and again short-time press, will in turn display P2, P3…

3.2.4. ☼/ENTER — Back light and entrance key

(a) When in the measuring state, short press (less than 1.5s) to open or close the back light display;

(b) When in the calibration state or the parameter setting state, press this key to confirm, and then the meter enters into measuring state;

(c) When in pH mode, long press the key to change pH resolution: 0.01→0.1 pH; then release.

3.2.5. M+/RM — The combination key of memory and recall

(a) Short time press (press time less than 1.5s) to save the measuring data, long time press

(press time more than 2s) to recall the saved measuring data when in the measurement state.

(b) When in the parameter setting state, press this key to alter the number or ON/OFF state.

### 3.3. The Storage, Recall and Elimination of the Measuring Information:

3.3.1. Store the measuring information:

In the measuring mode, when the measuring data is stable and appear the "☺", short-time press M+/RM key(less than 1.5s), LCD will display " **M+** " icon and storage serial number, and meanwhile memory all the measuring information. Meter can separately store 100 groups of measuring information in the mode of pH and mV, can totally store 200 groups.

3.3.2. Recall measuring information:

(a) Under the measuring mode, depress the M+/RM key, meter will recall the last stored information, and the storage number and **"RM"** icon and the complete measuring information will appear in the lower right corner of the LCD. Again press CAL or M+/RM key, meter will in turn recall all the measuring information, depress CAL or M+/RM key can quickly query measuring information under other serial number;

(b) In the recalling mode (there are " **RM** " and storage serial number in the upper right corner of the LCD), press ENTER key to return to the measuring mode.

3.3.3. Eliminate the stored measuring information:

In the recalling mode, depress the ENTER key for 5 seconds, LCD will appear " CLr " for 2 seconds. It means the storage has been eliminated, and returns to measuring mode.

## 4. pH Measurement:

### 4.1. Preparation Work:

4.1.1. Press ON/OFF key to turn on.

4.1.2. Install the model 201T-S pH/ATC three in one combination pH electrode into meter's socket.

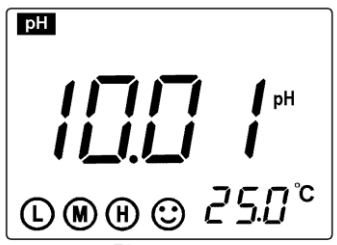
### 4.2. Meter Calibration:

4.2.1. Press CAL to enter into calibration mode, LCD displays the twinkling "C1" indicate to enter into the first point calibration.

4.2.2. Wash the pH electrode in purified water and dry it, then immerge it into the pH7.00 buffer solution, rock the electrode holder and then still, waiting for the data stable and appear " ☺ ", then again press key CAL, the LCD will appear a twinkling 7.00 pH, calibration finishes after several seconds and appear a stable pH value and a twinkling "C2", indicates the first point calibration has been finished and enters into the second point calibration.

4.2.3. Wash the pH electrode in purified water and dry it, then immerge it into the pH4.00 buffer solution, rock the electrode holder and then still, waiting for a stable data and appear " ☺ ", then again press key CAL, the LCD will appear a twinkling 4.00pH, calibration finishes after several seconds, LCD will appear a stable pH value and a twinkling "C3", indicates the second point calibration has been finished and enters into the third point calibration.

4.2.4. Wash the pH electrode in purified water and dry it, then immerge it into the pH10.01 buffer solution, rock the



Picture(4-1)

☺

CAL

electrode holder and still, waiting “ ” for the data stable and appear, then again press key , LCD will appear a twinkling 10.01 pH, calibration finishes after several seconds, appear a stable pH value and “ ” three calibration indica Ⓛ Ⓜ Ⓗ picture (4-1), indicates the three-point calibration has been finished and entered into measuring mode.

4.2.5. Note:

(a) This meter can adopt random one-point, two-point or three-point automatic calibration, after the first point calibration (see item 4.2.2.), press ENTER to confirm one-point calibration and enters into measuring mode. The indication icon “ Ⓜ ” for one-point calibration will appear on the lower left corner of LCD. When the measuring accuracy is $\leqslant \pm 0.1$pH, user just need to choose one kind buffer solution to take one-point calibration according to the measuring range.

(b) After the second point calibration, (see item 4.2.3.), press ENTER to confirm two-point calibration and enter into measuring mode. The indication icon “Ⓛ Ⓗ” for tow-point calibration will appear on the lower left corner of LCD. User can choose pH4.00 and pH7.00 to calibrate if the measurement is just within the acidity range and choose pH7.00 and pH10.01 to calibrate if just within the alkalinity range.

(c) User should choose three-point calibration so as to reach a more accurate measurement if the measuring range is wide, or if the electrode has been used for long or has ageing phenomenon. As to the new electrode which be used for the first time, it must be calibrated by three-point calibration to keep the unanimity of the meter slope adjustment with the pH electrode.

**4.3. Sample Test:**

Immerge pH electrode into the sample solution after washing and dry it, rock the electrode holder and still, when the LCD appears the icon “ ☺ ” to take the reading

after displaying value to be stable.

**Note: According to the pH equal temperature measuring theory: the closer the temperature of the sample solution with the calibration solution, the more accurate the measuring value will be acquired. So please comply with this theory.**

## 4.4. Parameter Setting:

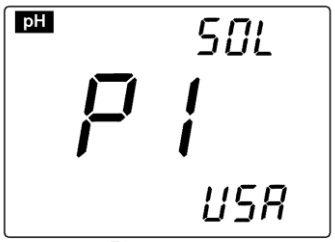
4.4.1. pH measuring parameter setting schedule (Chart (4-1))

Chart (4-1)

| Prompt | Parameter Setting Items | Code | Parameters |
|---|---|---|---|
| P1 | pH buffer solution series selection | SOL | USA(Europe & U.S.A series)<br>NIS (NIST series)<br>CH (China series) |
| P2 | Purified water pH temperature compensation setting | PU 1 | OFF-On (shut-set) |
| P3 | Ammonia added purified water pH temperature compensation setting | PU 2 | OFF-On (shut-set) |
| P4 | Temperature unit setting | | ℃ ℉ |
| P5 | Back light display time | bL | 0-1-3-6min |
| P6 | Auto power off setting | AC | 0-10-20min |
| P7 | Restore to producer setting | | OFF-On ( shut-set) |

4.4.2. pH buffer solution series selection (P1)

(a) Depress MODE key, meter enters into P1 mode: see picture (4-2).



Picture (4-2)

(b) Press CAL or M+/RM key to choose buffer solution series:

USA ( Europe & U.S.A series) —1.68, 4.00, 7.00,10.01 and 12.45 pH

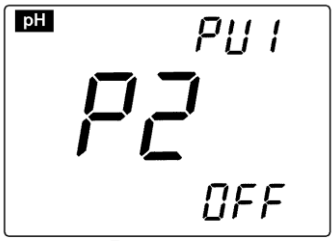
n IS (NIST series) — 1.68, 4.01, 6.86, 9.18 and 12.45 pH

CH (China series) — 1.68, 4.00, 6.86, 9.18 and 12.46 pH

(c) Press MODE key to enter into next parameter setting or press ENTER key to conform and return to measuring mode.

4.4.3. Purified water pH temperature compensation setting (P2)

(a) Short press MODE key in the mode P1, the meter enters into mode P2, see picture (4-3).



Picture (4-3)

(b) Press CAL or M+ RM to choose " On " (purified water pH temperature compensation setting) or " OFF " (shut).

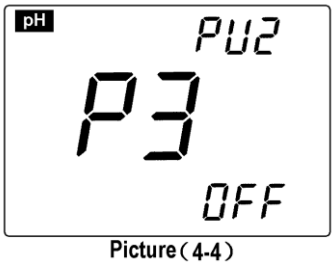
(c) Press MODE key to enter into next parameter setting or press ENTER key to conform and return to measuring mode.

(d) The producer setting is " OFF ".

**Note: There will appear " PU - 1 " icon in the upper right corner of the LCD if purified water temperature compensation function was set.**

4.4.4. Ammonia added purified water pH temperature compensation setting (P3)

(a) Short press MODE key in mode P2 to enter into mode P3, see picture (4-4).



Picture (4-4)

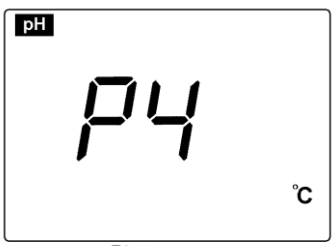
(b) Press CAL or M+ RM key to choose " On " (ammonia added purified water pH temperature compensation setting) or " OFF " (shut).

(c) Press MODE key to enter into next parameter setting or press ENTER key to conform and return to measuring mode.

(d) The producer setting is " OFF ".

**Note: If set the ammonia purified water pH temperature compensation function, there will appear " PU -2 " icon in the right upper corner of the LCD when in the measuring mode.**

4.4.5. Temperature unit ℃/℉ setting (P4)



Picture (4-5)

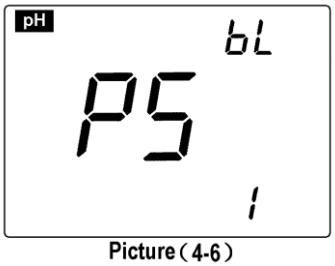
(a) Short press MODE key in mode P3 to enter into mode P4, see picture (4-5).

(b) Press CAL or M+/RM key to choose temperature unit: ℃ or ℉.

(c) Press MODE key to enter into next parameter setting or press ☼/ENTER key to conform and return to measuring mode.

4.4.6. Back light display time setting (P5)

(a) Short press MODE key in mode P4 to enter into mode P5, see picture (4-6).



Picture (4-6)

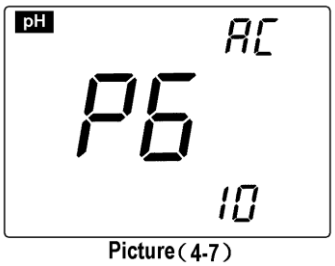
(b) Press CAL or M+/RM key to choose the time of back light auto power off: 0 min, 1 min, 3 min or 6 min. The back light display function will be closed if choosing a 0min.

(c) Press MODE key to enter into next parameter setting or press ☼/ENTER key to conform and return to measuring mode.

(d) The producer setting for P5 is 1min.

4.4.7. Auto power off time setting (P6)

(a) Short press MODE key in mode P5 to enter into mode P6, see picture (4-7).



Picture (4-7)

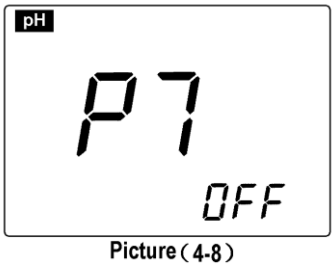
(b) Press CAL or M+/RM key to choose the time: 0min, 10min or 20min. The auto power off function will be closed if choosing 0min.

(c) Press MODE key to enter into next parameter setting or press ☼/ENTER key to conform and return to measuring mode.

(d) The producer setting for P6 is 10min.

4.4.8. Restore to producer setting (P7)

(a) Short press MODE key in mode P6 to enter into mode P7, see picture (4-8).



Picture (4-8)

(b) Press CAL or M+ RM key to choose ‘On ”, means that all the pH measuring parameters have been restored to the producer setting mode, and restore to measuring mode after 2 seconds.

**4.5. Considerations:**

4.5.1. Calibration times of meter rely on the sample, electrode performance and required accuracy. For high accurate measurement (≤±0.02pH), which should be calibrated immediately with high accurate standard buffer solution, for general accuracy measuring (≤±0.1pH), which can be used almost one week or long time once be calibrated.

4.5.2. The meter must be recalibrated in the following situations:

(a) New changed or unused electrode for a long time;

(b) After measuring acid (pH<2) or alkaline (pH>12) solution;

(c) After measuring solution which contains fluoride and concentrated organic solution;

(d) The solution’s temperature is much different with calibration temperature.

4.5.3. The soaking solution in the protecting bottle of front pH electrode is to keep the glass bulb and junction activating. Loose the capsule, pull out the electrode and wash it in purified water before measuring. Insert the electrode and screw tight the capsule after measuring to prevent the solution leaking. If the soaking solution is turbid or moldy, please wash and change a new one at once.

4.5.4. The preparation of the soaking solution: take 25g analytical pure KCL, dissolved with purified water and dilute to 100mL. Electrode should avoid soaking in purified water protein solution and acid fluoride solution for a long time as well avoid getting touching with organic silicon lipidic matters.

4.5.5. To calibrate the meter with the given value pH buffer solution, the pH value of the standard buffer solution must be reliable so as to improve the accuracy. Buffer solution should be changed in time after many times using.

4.5.6. Always keep the meter clean and dry; especially for the socket of meter and electrode, otherwise it may lead to an inaccurate measurement or invalidity. To clean and dry them with medical cotton with dehydrated alcohol if there are any dirty.

4.5.7. The sensitive glass bulb in the front of combination electrode should not touch with hard things, any broken and rough will make the electrode invalidity. Before and after measuring, the electrode should be washed with purified water, and dry electrode after washing, don't clean glass bulb with tissue for it will effect stability of electrode potential and enlarge response time. The electrode should be washed many times for removing the sample stuck on the electrode, or wash with suitable solvent then clean the solvent with purified water after measuring sticky sample.

4.5.8. An electrode be used for a long time, or measured solution which contains a polluting solute easily for the sensitive bulb, or a substance resulting in jam at the junction, the electrode will be getting passivated, its sensitivity will decrease and its response is getting slow, the reading are not correct. It could adopt the following method for various cases:

(a) The glass bulb is contaminated and aging: Put the electrode into 0.1mol/L dilute hydrochloric acid (Preparation: diluted 9mL hydrochloric acid to 1000mL with purified water) for 24h. Rinse it with purified water, then dipped it into the electrode dipping solution for 24h. If the passivation is serious, then user can also put the bulb of electrode into 4% HF (hydrofluoric acid) or the electrode activation solution for 3 to 5 seconds, rinsing it with purified water, and dipped it in the electrode soaking solution for 24h to renew it.

(b) Wash for contaminated glass bulb and junction: (For reference)

| Contamination | Abluent |
|---|---|
| Inorganic metal oxide | diluted acid less than 1mol/L |
| Organic lipidic matter | dilute washing (weak alkaline) |

| | |
|---|---|
| Resin macromolecule matter | dilute alcohol, acetone, ether |
| Proteinic haematocyte sediment | Acidic enzymatic solution (such as dried yeast) |
| Kinds of paint | dilute bleacher, peroxide |

4.5.9. pH electrode using period is about 1 year, but its life will be shortened if using condition is poor or incorrect maintenance. So it should be replaced immediately after electrode become aging or invalid.

4.5.10. When it appears an abnormal reading when calibration or displaying, please set P7 as "ON" to restore the meter to producer setting mode, and then to calibrate and measure again.

**4.6. The Self-diagnose Information:**

When using, there might appear the following icons. This is the meter's self-diagnose information, which can help to know some information about the meter or the electrode when using:

4.6.1. The stable icon -2.00 pH or the 19.99 pH — this icon appeared when the value has surpassed the measuring range. There will also appear such signs when the electrode is not well connected with the meter or when the electrode is not immerged into the solution. This is a normal phenomenon.

4.6.2. "Err 1" — Electrode zero potential to be exceeded (<-60mV or >60mV)

4.6.3. "Err2" — Electrode slope to be exceeded (< 85% or >105%)

When appear "Err 1" or "Err2", the meter can not work, please take the following check:

(a) Check if the electrode bulb has air bubble, if has, please shake it hardly.

(b) Check the quality of buffer solution, if it goes bad or the value has biggish error.

(c) Set the meter to producer setting mode (for details see P12 item 4.4.8.), then recalibrate it.

If still can not recover the normal state after doing the above checking, please replace a

new pH electrode.

## 5. mV Measurement:

### 5.1. Sample Test:

5.1.1. Press ON/OFF key to turn on, and short press MODE to switch to mV mode;

5.1.2. Connect the ORP (sold separated), immerge it into the sample solution, slowly stir and then still. When there appear a "☺" and a stable reading, that is the value.

### 5.2. Parameter Setting:

5.2.1. mV measurement parameter setting schedule (Chart (5-1))

Chart (5-1)

| Prompt Mark | Parameter Setting Items | Code | Parameters |
|---|---|---|---|
| P1 | Back light display time setting | bL | 0 -1-3-6 min |
| P2 | Auto power off time setting | AC | 0 -10-20 min |

5.2.2. Back light display time setting (P1)

Depress the MODE key, the meter enters into mode P1, see detailed operations in P12 item4.4.6.

5.2.3. Auto power off time setting (P2):

Press the MODE key in mode P1, the meter enters into mode P2, see detailed operations in P12 item 4.4.7.

## 6. Meter's Complete Kit:

| | |
|---|---|
| 6.1. Model PH900 pH/mV meter | 1unit |
| 6.2. 201T-S plastic pH/ATC three-in-one combination electrode | 1pc |
| 6.3. pH standard buffer solution (pH4.00, pH7.00 and pH10.01/50mL) | 1btl/each |
| 6.4. Screw driver | 1pc |
| 6.5. Spare AA batteries | 2pcs |
| 6.6. Operation manual | 1pc |
| 6.7. Carrying case | 1unit |

## 7. Warranty:

7.1. We warrant this meter to be free of charge maintain, replace the parts or products under normal using circumstances, from purchased time within one year caused by manufacturing bad and unable to work.

7.2. Attached electrodes do not belong to this warrant range. But, if the newly purchased electrode went wrong without using, it's free of charge to maintain and replace.

7.3. The above warranty is not apply to defects resulting from action of user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification.

## Chart I Meter Parameter Setting Schedule

| Mode | Prompt Mark | Parameter Setting Items | Code | Parameter |
|---|---|---|---|---|
| pH | P1 | pH buffer solution series selection | SOL | USA (Europe & U.S.A. series)<br>NIS (NIST series)<br>CH (China series) |
| | P2 | Purified water pH temperature compensation setting | PU-1 | OFF-On (shut-set) |
| | P3 | Purified water added with ammonia pH temperature compensation setting | PU-2 | OFF-On (shut-set) |
| | P4 | Temperature unit setting | | ℃ ℉ |
| | P5 | Back light display time setting | bL | 0-1-3-6min |
| | P6 | Auto power off time setting | AC | 0-10-20min |
| | P7 | Restore to producer setting | | OFF-On (shut-set) |
| mV | P1 | Back light display time setting | bL | 0-1-3-6min |
| | P2 | Auto power off time setting | AC | 0-10-20min |

## Chart Ⅱ Meter Restore to Producer Setting Schedule

| Mode | Prompt Mark | Parameter Setting Items | Producer Setting Content | Non Producer Setting Content Icon |
|---|---|---|---|---|
| pH | P2 | Purified water pH temperature compensation setting | OFF | PU-1 |
| | P3 | Purified water added with ammonia pH temperature compensation setting | OFF | PU-2 |

## Chart Ⅲ Code Icon and Abbreviation Schedule

| Code and Abbreviation | English | Explanation |
|---|---|---|
| SOL | Solution | Standard solution |
| CH | China | China series standard |
| USA | USA | Europe & U.S.A series standard |
| nIS | NIST | NIST series standard |
| PU-1 | Pure-1 | Purified water pH temperature compensation setting |
| PU-2 | Pure-2 | Purified water added with ammonia pH temperature compensation setting |
| End | End | |