



P100 Handheld pH Meter

Instruction Manual



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1. Introduction

Thank you for purchasing our P100 Handheld pH Meter.

This meter is a perfect combination of the advanced electronic technology, sensor technology and software design, and is the most cost effective handheld electrochemical meter which is suitable for usage in industrial and mining enterprises, power plant, water treatment engineering, environmental protection industry, etc, especially suitable for application in field.

With built-in microprocessor chip, beautiful appearance and easy to use, this meter has the following prominent features:

- Intelligent functions, such as automatic calibration, automatic temperature compensation, functions setting, self-diagnosis, automatic power-off and low voltage display etc.
- With advanced digital processing technology, the response speed and accuracy are greatly improved. Stable reading display mode is also equipped and reading stability criteria can be set.
- 1 to 3 point automatic calibration with calibration instruction and automatic checking functions.
- Automatically recognize 6 types of pH buffer solution. Buffer solution selectable: USA series, NIST series and customer-defined solution.
- The meter meets IP67 dust and water proofing rate.

2. Specifications

2.1 Technical Parameters:

	Technical Parameters	
pH	Measuring Range	(0.00 ~ 14.00) pH
	Resolution	0.1/0.01 pH
	Accuracy	±0.01 pH ±1digit
	Temperature Compensation Range	(0 ~ 100) °C (Auto. or Manual)
mV	Measuring Range	±1000mV
	Resolution	1mV
	Accuracy	±0.1% FS ±1digit
Temp.	Measuring Range	0~100°C
	Resolution	0.1°C
	Accuracy	±0.5°C±1digit

2.2. Other technical parameters:

Power	AA batteries × 3 (1.5V× 3)
IP rating	IP67
Dimension & Weight	Meter: (86×196×33)mm / 335g
Quality and Security Certificate	ISO9001:2008 and CE

3. Instrument Description

3.1. LCD display:

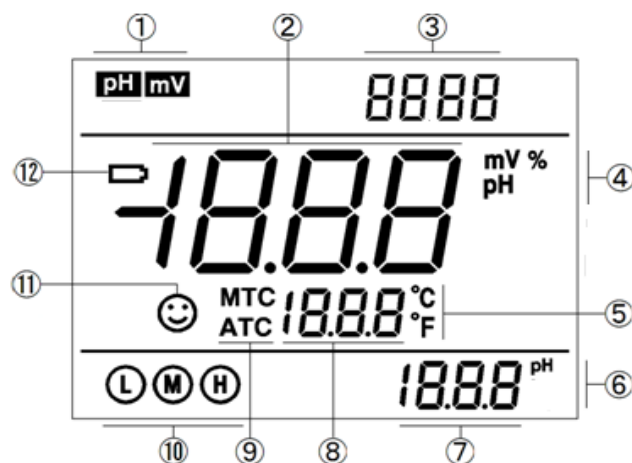


Diagram-1 LCD Display Screen

- | | |
|--------------------------------------|---|
| ① — Measuring mode icons | ⑧ — Temperature value and prompts |
| ② — Measurements | ⑨ — Temperature compensation state icons |
| ③ — Prompts | ATC — automatic temperature compensation, |
| ④ — measurement units | MTC — manual temperature compensation |
| ⑤ — Temperature units | ⑩ — Calibration indication icon |
| ⑥ — Units of pH calibration value | ⑪ — Stable reading indication icon |
| ⑦ — pH calibration value and prompts | ⑫ — Low battery icon, when this icon appears, |
| | please renew the battery |

3.2. Keypad functions

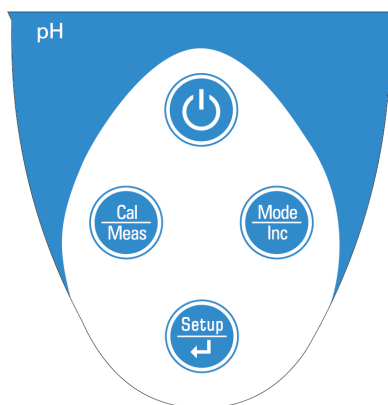




Diagram-2 Keypad panel

3.2.1. Keypad operations: Short press ----- <1.5 seconds , Long press ----- >1.5 seconds.

3.2.2. Turn on the meter: Press  to turn on the meter: LCD full display → display some parameters setting content→ display the last measuring mode before turning off

3.2.3. Turn off the meter

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









Note: 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.

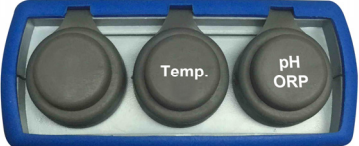
Chart -1 Keypad operations and functions

Keypad	Operations	Functions
	Short press	<ul style="list-style-type: none"> In the power-off mode, press this key to turn on the meter
	Long press	<ul style="list-style-type: none"> In the measurement mode, press and hold this key for 2 seconds to turn off the meter.
	Short press and Long press	<ul style="list-style-type: none"> In the measurement mode: Press this key to select measurement mode: pH → mV In the mode of manual temperature compensation (MTC), when press and hold this key, the temperature value flashes, then press this key to change the temperature value (in one direction), and press  to confirm. In the parameter set-up mode, press this key to change the serial number of the main menu and the submenu (in one direction). In the submenu mode, press this key to change parameters and set-up (in one direction).
	Short press	<ul style="list-style-type: none"> In the measurement mode, press this key to enter in the calibration mode In the calibration mode or the parameter set-up mode, press this key to return to the measurement mode.
	Short press	<ul style="list-style-type: none"> In the measurement mode, press this key to enter in the parameter set-up main menu. In the calibration mode, press this key to conduct calibration. In the parameter set-up mode, press this key to select programs.

3.3. Meter Sockets

The meter is with BNC and RCA sockets, which are protected by grey rubber caps. (As showed in Chart-2)

Chart-2- Meter sockets

Photos	Descriptions
	<p>BNC socket (Right) — for pH or ORP probe ;</p> <p>RCA socket (Middle) — for temperature probe.</p>

3.4. Reading stable display mode

When the measuring value is stable, smiley icon ☺ appears 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. In parameter-setting P1.6, there are 3 criteria for stability:

NOR (Normal), **HI** (High) and **LO** (Low). The factory default set is “Normal”.

“High” is set for stability for longer time; “Low” is set for stability for shorter

time. Customer can select suitable stability criteria according to different testing requirements.

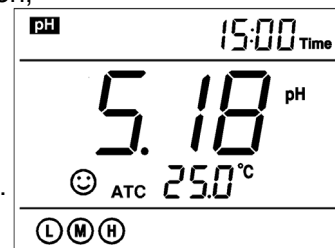


Diagram- 3

3.5. Auto power-off

The meter will be automatically power-off if nothing is done for 20 minutes. In the parameter setting menu P6.8, customer can set up to turn on or turn off this function.

4. pH measurement

4.1. pH probe information

The meter is equipped with a 201T-F three-in-one combination pH probe, which has built-in temperature sensor to realize automatic temperature compensation. The BNC plug of the probe is connected to the pH socket while the RCA plug is connected to the temperature socket. When the probe is immersed in the solution, please stir the solution briefly to get rid of the air bulb and in this way, a stable measurement will be reached fast.

4.2. pH calibration related information

4.2.1. Standard buffer solution

Buffer solution selectable: USA series and NIST series, and also customer-defined solution. Please refer to clause 6.3 and select a proper series in parameter setting menu P1.1. Please see Chart - 3 for the two series of standard buffer solution.

Chart - 3 pH standard buffer solution series

Icons		pH standard buffer solution series	
		USA series	NIST series
Three-point calibration	(L)	1.68pH and 4.00 pH	1.68pH and 4.01 pH
	(M)	7.00 pH	6.86 pH
	(H)	10.01 pH	9.18 pH

4.2.2. Three-point calibration mode

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 – 4. During the calibration process, the instrument displays the probe slope of acidity range and alkalinity range respectively.

Chart - 4 Three-point calibration mode

	USA standard	NIST standard	Indication Icon	Applicable range
One-point calibration	7.00 pH	6.86 pH	(M)	Accuracy ≤ ±0.1pH
Two-point calibration	7.00 pH and 4.00 pH or 1.68pH	6.86 pH and 4.01 pH or 1.68pH	(L) (M)	Range<7.00pH
	7.00 pH and 10.01 pH	6.86 pH and 9.18 pH	(M) (H)	Range>7.00pH
Three-point calibration	7.00 pH, 4.00 pH or 1.68pH, 10.01 pH	6.86 pH, 4.01 pH or 1.68pH, 9.18 pH	(L) (M) (H)	Large Range


4.2.3. Calibration intervals


Calibration intervals depend on the sample, the probe performance, and the required accuracy. For high accuracy measurements ($\leq \pm 0.02\text{pH}$), the meter should be calibrated before taking a measurement. For general accuracy ($\geq \pm 0.1\text{pH}$), after one time calibration, the meter can be used for approximately one week or longer.



The meter must be recalibrated in the following situations:



- (a) New probe or probe that is unused for a long period of time
- (b) After measuring acids solution ($\text{pH} < 2$) or alkaline solutions ($\text{pH} > 12$)
- (c) After measuring solution that contains fluoride or strong organic solution
- (d) If the solution's temperature differs greatly from the calibration solution temperature

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

4.3.1. Press  key to enter into the calibration mode, "CAL 1" blinks at the top right of LCD screen and "7.00 pH" blinks at the bottom right of LCD screen, indicating using pH 7.00 buffer solution to make the 1st point calibration.

4.3.2. Rinse pH probe in pure water, allow it to dry, and submerge it in pH7.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. The scanning and locking process of buffer solution will be showed at the bottom right corner of LCD screen. **Er 2** will be showed if press  key before the value is locked. See chart – 5.

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

4.3.4. Take out pH probe, rinse it in pure water, allow it to dry, and submerge it in pH4.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. The meter's screen 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. **End** icon and probe slope of acidity range will be displayed after calibration is done, meanwhile, the meter's screen will show at the top right a blinking CAL3, and show at the bottom right blinking 10.01pH, indicating using pH 10.01 buffer solution to make the 3rd point calibration.

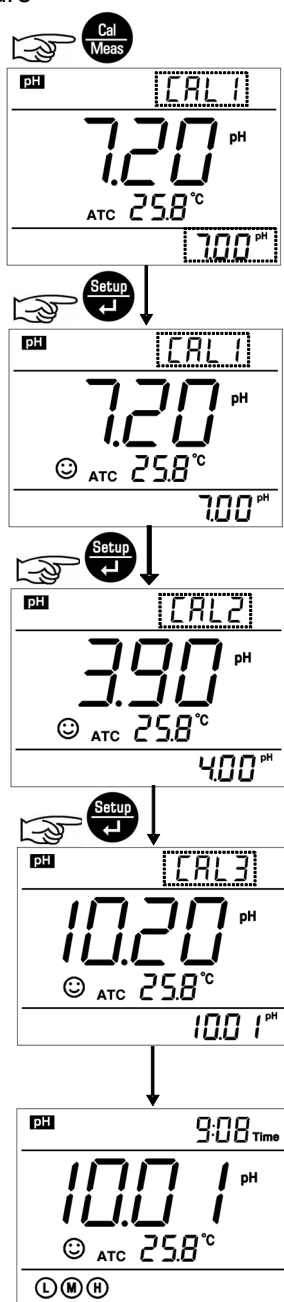











Diagram- 4




4.3.5. Take out pH probe, rinse it in pure water, allow it to dry, and submerge it in pH10.01 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached. The meter's display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. When the meter locks 10.01 pH, stable ☺ icon displays on LCD screen. Press  key to calibrate the meter. **End** icon and probe slope of alkalinity range will be displayed after calibration is done. The meter goes to the measurement mode. Stable measuring value and calibration indication icons    will be showed. Please see Diagram – 4 for the above calibration process.




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

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


4.4.1. Select **CUS** in parameter setting P1.1 (please refer to clause 6.3 for details). The meter enters into customer-defined calibration mode. Press  key, a blinking **CAL1** icon will be shown at the top right of LCD screen, indicating the meter enters into the 1st point customer-defined calibration.

4.4.2. Rinse pH probe 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 the stable measurement value and ☺ icon appear on the LCD screen, press  key, and the pH value blinks. Press  key to adjust the main value to 1.60, then press  key to calibrate the meter. After calibration is done, blinking **CAL2** icon will be shown at the top right corner of the LCD screen, indicating the meter enters into the 2nd point customer-defined calibration.

4.4.3. Rinse pH probe 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 the stable measurement value and ☺ icon appear on the LCD screen, press  key, and the pH value blinks. Press  key to adjust the main value to 6.50, then press  key to calibrate the meter. After calibration is done, the meter goes to the measurement mode. For customer-defined calibration, LCD does not show probe calibration indication icons.

Note: If ordinary pH combination probe is used (no temperature sensor), customer needs to perform manual temperature compensation (MTC). Press  key, the temperature value blinks, press  key to adjust the temperature value, and press  key, pH value blinks.

4.4.4. Notes

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

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

4.5. Solution measurement

4.5.1. Rinse pH probe in pure 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 – 5 is the calibration and measurement process of pH meter

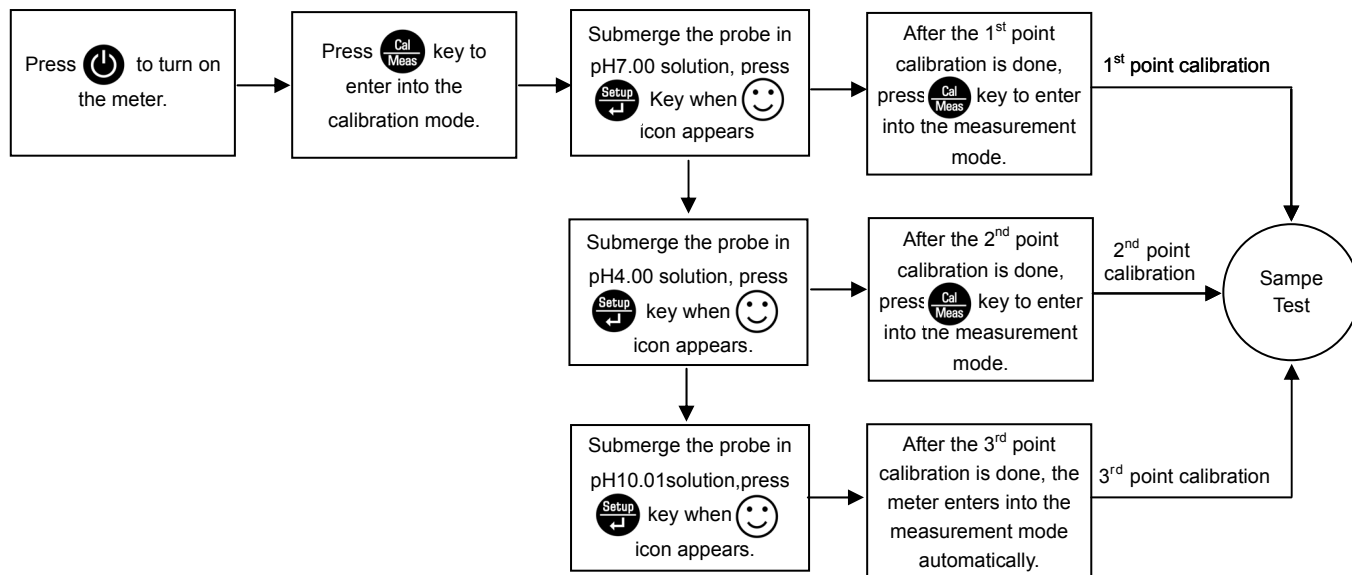


Diagram – 5 Calibration and measurement process of pH meter

4.5.2. Self-diagnostic information

During the process of calibration and measurement, the meter has self-diagnosis functions, and will indicate the relative information as below. Please refer to chart – 5.

Chart – 5 Self-diagnostic information of pH measurement mode

Icons	Self-diagnostic information	Check up
<i>Er 1</i>	Wrong pH buffer solution or exceed the recognition range of the meters	1.Check if the pH buffer solution is accurate 2.Check if the connection between meter and probe is good 3.Check if the probe is failed
<i>Er 2</i>	Press key when measuring value is not stable during calibration.	Press when icon appears
<i>Er 3</i>	During calibration, the measuring value is not stable for ≥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
<i>Er 4</i>	pH probe zero electric potential exceeds standard (<-60mV or >60mV).	1.Check the probe bulb and make sure there is no air bulb in it
<i>Er 5</i>	pH probe slope exceeds standard (<85% or >110%).	2.Check if the pH buffer solution is correct 3.Replace the pH probe with a new one
<i>Er 6</i>	pH measuring range exceeds standard (<0.00 pH or >14.00pH).	1.Check if the probe is suspended in the air 2.Check if the connection between meter and probe is good 3.Check if the probe is failed

4.5.3. pH isothermal measurement principle

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

4.5.4. Restore to factory default setting

For factory default setting, please refer to parameter setting P1.5 (clause 6.3). 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 appendix -1). 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.

4.6. pH probe maintenance

4.6.1. Daily maintenance

The soaking solution contained in the supplied protective bottle is used to maintain activation of the glass bulb and junction. Loosen the bottle cap, pull out the probe and rinse the probe in pure water before taking a measurement. Insert the probe and tighten the bottle cap after measurements to prevent the solution from leaking. If the soak solution is turbid or moldy, please replace the solution in time. The probe should not be soaked in pure water, protein solution or acid fluoride solution for long periods of time. In addition, do not soak the probe in organic grease lipids.

For best accuracy, always keep the meter, especially the connectors of the meter and probe clean and dry. Clean with medical cotton and alcohol if polluted.



4.6.2. Buffer solution

For better measurement accuracy, the pH value of the standard buffer solution must be reliable. The buffer solution should be fresh. The buffer solution should be replaced after frequent usage.

4.6.3. Protection of glass bulb

The sensitive glass bulb at the front of the combination probe should not touch with hard surfaces. Scratches or cracks on the probe will cause inaccurate readings. Before and after each measurement, the probe should be washed with pure water and dried. Do not clean the glass bulb with tissue as it will affect the stability of the probe potential and prolong the response time. The probe should be thoroughly cleaned if testing in sticky samples. Or wash the probe with proper solvent.

5. mV measurement

5.1. Press  key, and switch the meter to mV measurement mode. Connect ORP probe (need purchase it separately) and dip it in sample solution, stir the solution briefly and allow it to stay in the solution until  icon appears. The reading obtained is ORP value. ORP stands for Oxidation Reduction Potential. The unit is mV.

5.2. Notes

5.2.1. ORP measurement does not require calibration. When the customer 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.



5.2.2. Clean and activate ORP probe

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

- (a) For inorganic pollutant, submerge the probe in 0.1mol/L dilute hydrochloric acid for 30 minutes, wash it in pure water, and then submerge it in 4M KCl soaking solution for 6 hours.
- (b) For organic or lipid pollutant, clean the platinum surface with detergent, then wash it in pure water, then submerge it in 4M KCl 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 pure water, then submerge it 4M KCl the soaking solution for 6 hours.

6. Parameter setting



6.1. Main menu



In the measurement mode, press  key to enter in P1.0, then press  to switch to main menu: P1.0→P6.0. Please refer to chart – 6.

P1.0: pH parameter setting menu,

P6.0: Basic parameter setting menu.

6.2.Submenu

6.2.1. In P1.0 mode, press  key to enter in submenu P1.1 of pH parameter setting, then press  key to switch among submenu: P1.1→P1.4→P1.5→P1.6, see Diagram –6.

6.2.2. In P6.0 mode, press  key to enter in submenu P6.1 of basic parameter setting, then press  key to switch among submenu: P6.1 →P6.8. see Diagram – 6.

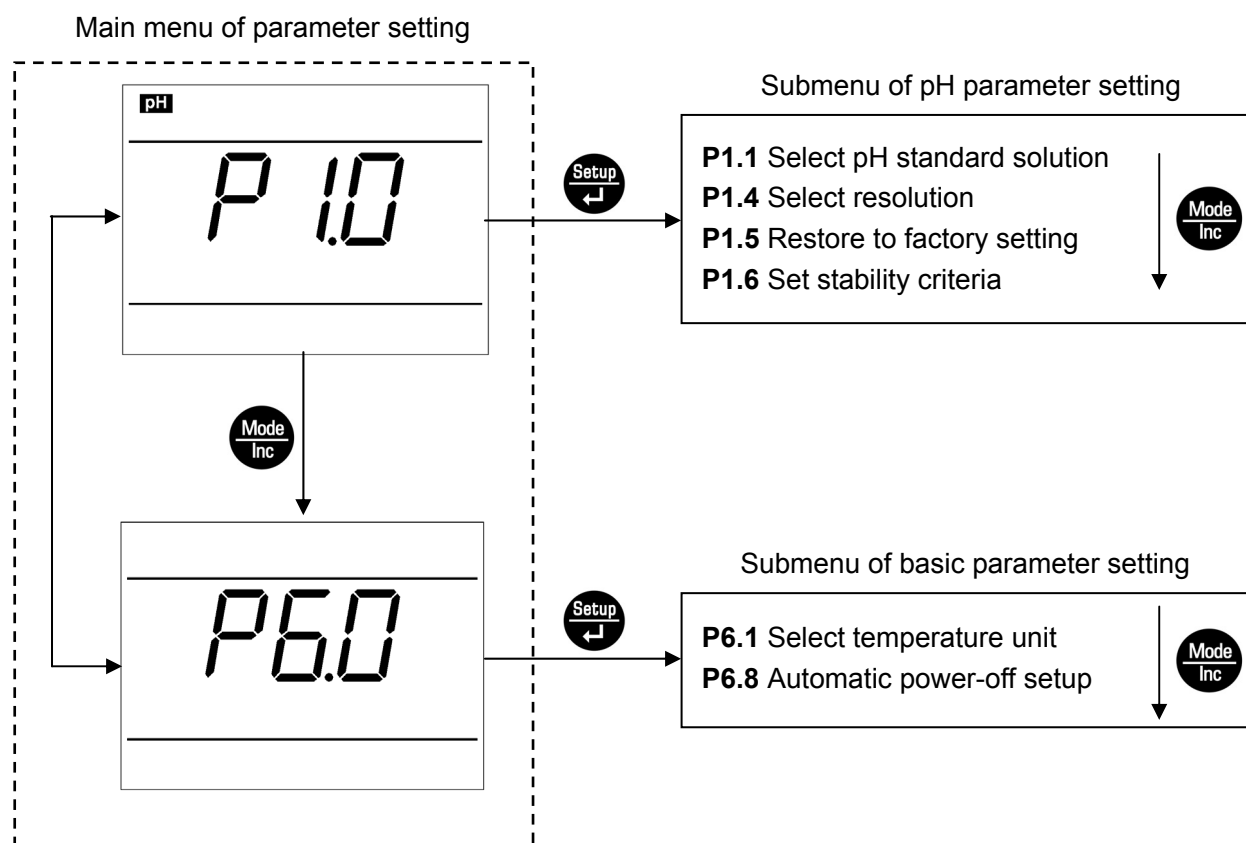
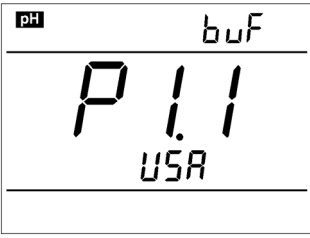






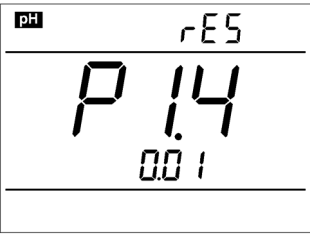





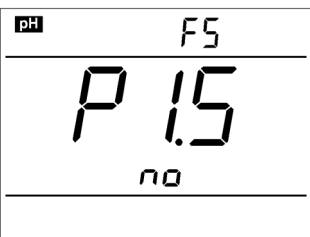





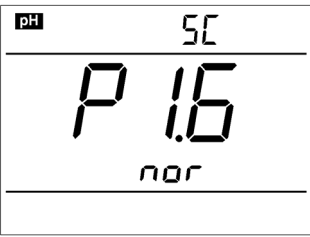




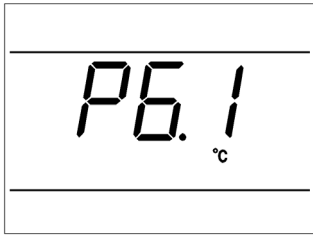






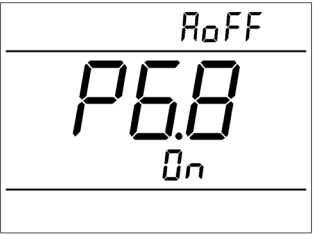






Diagram – 6 Main menu and submenu of parameter setting

6.3. Submenu of pH parameter setting (press key to switch)

	<p>P1.1 – Select pH standard solution (USA-NIS-CUS)</p> <ol style="list-style-type: none"> 1. In P1.0 mode, press  to enter in P1.1, refer to the left Diagram. 2. Press  key, USA blinks, press  key to select NIS→CUS. Press  to confirm. USA-USA series; NIS-NIST series; CUS – customer-defined. 3. After confirm parameter, press  key to enter in P1.4 mode, or press  key to return to the measurement mode.
	<p>P1.4 – Select resolution (0.01 – 0.1)</p> <ol style="list-style-type: none"> 1. Press  key, 0.01 blinks, press  key to select 0.1→0.01 Press  key to confirm. 2. After confirm parameter, press  key to enter in P1.5 mode, or press  to return to the measurement mode.
	<p>P1.5 – Restore factory setting (No – Yes)</p> <ol style="list-style-type: none"> 1. Press  key, No blinks, press  key to select Yes→No, Press  key to confirm, the meter returns to the measurement mode No – Do not restore, Yes – Restore to factory setting. 2. Press  key to enter in mode P1.6, or press  key to return to the measurement mode.
	<p>P1.6 – Set reading stability criteria (Normal – High – Low)</p> <ol style="list-style-type: none"> 1. Press  key, nor blinks. Press  key to select Hi→Lo→nor Press  to confirm. Nor – Normal, Hi – High, Lo – Low. 2. Press  to return to the measurement mode.

6.4. Basic parameter setting submenu

	<p>P6.1. Select temperature unit (°C—°F).</p> <ol style="list-style-type: none"> 1. In P6.0 mode, press  key to enter in P6.1 mode, please refer to the left Diagram. 2. Press  key, °C blinks, then press  key to select °F→°C Press  key to confirm. 3. When parameter is confirmed, press  key to enter in mode P6.8 or press  key to return to the measurement mode.
	<p>P6.8 – Automatic power-off setup (On-Off)</p> <ol style="list-style-type: none"> 1. Press  key, On blinks, press  key, Off → On. Press  key to confirm. On – turn on automatic power-off, Off – turn off automatic power-off. 2. After confirm the parameter, press  key to return to the measurement mode.

7. Meter Kits

No.	Include	Quantity
7.1	P100 pH meter	1
7.2	201T-F three-in-one pH probe	1
7.3	AA Battery	3
7.4	Screw driver	1
7.5	Instruction manual	1
7.6	Quick Manual	1

8. Warranty

8.1 For three years since the date of purchasing, under regular service condition, we warrant that the instrument (probe is not included) will be repaired, replaced parts or product free of charge if the meter doesn't work well due to quality defects.

8.2 This warranty does not apply to defects resulting from incorrect usage, improper maintenance or repair.

Appendix I: Parameter setting & Factory default setting

Modes	Prompts	Parameter setting items	Code & Abbr.	Description	Restore to factory default
P1.0 pH	P1.1	Select pH buffer solution	buf	USA – NIST – CUS	USA
	P1.4	Select resolution	rES	0.01 – 0.1	0.01
	P1.5	Restore to factory default setting	FS	No – Yes	No
	P1.6	Set reading stability criteria	SC	Nor—Hi—Lo	Nor
P6.0 Basic Parameters	P6.1	Select temperature unit	–	°C—°F	–
	P6.8	Automatic Power-off setup	RoFF	On—Off	–

Appendix II: Code symbol & 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
	P1.5	FS	Factory default setting	Factory default setting
	P1.6	SC	Stability criteria	Set up reading stability criteria
P6.0 Basic parameters	P6.1	/		
	P6.8	ROFF	Automatic Power-off	Automatic Power-off
Others		USA	United States of America	United States of America
		n 15	NIST	American National Standard
		CUS	Customer-defined	Customer-defined
		nor	Normal	Normal
		HI	High	High
		Lo	Low	Low
		OFF	Off	Off
		On	On	On
		no	No	No
		YES	Yes	Yes

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