9500 Premium Series
Benchtop pH/Conductivity Meter
User Manual

PH9500 Benchtop pH Meter ☐

EC9500 Benchtop Conductivity Meter ☐

PC9500 Benchtop pH/Conductivity Meter ☐

RoHS compliant ISO 9001:2015 CE

APERA INSTRUMENTS, LLC

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Notes

- When the meter is connected to PC, do not pull out the USB cable until the meter is turned off. Otherwise a system crash could occur. To fix the crash, pull out the power cord, put it back in, and reboot the meter.
- Please do NOT pull out the power cord when the meter is turned on.

1 Introduction

Thank you for choosing Apera 9500 Premium Series Benchtop pH/Conductivity Meter. Before using this product, please read this manual carefully.

9500 Series Benchtop Meter is an outstanding combination of advanced electronic technology, sensor technology and intuitive software design, made for laboratory pH and conductivity measurement in scientific research and quality control, fully meeting GLP (Good Laboratory Practice) standards.

1.1 Parameters

Measurement parameter	PH9500	EC9500	PC9500
pH/mV	✓		✓
Cond./TDS/Salinity/Resistivity		✓	✓
Temperature	✓	✓	✓

1.2 Basic Features and Functions

- Large TFT color display with a user-friendly navigation system.
- Self-diagnosis function reminds users of electrode invalidity, incorrect calibration solutions, or incorrect operation.
- Fully meets GLP (Good Laboratory Practice) Standard. Users can attach a keyboard to set up calibration password, sample ID, electrode ID, user ID, and company name.
- Users can attach a printer (sold separately) to print out data meeting GLP/GMP standard.
-  button to check on the built-in instructions of the meter
- Multi-language operation system, including English, German, Spanish, and Chinese.
- Equipped with a multi-functional Test-Bench, composed of a flexible electrode holder, buffer organizers, and an intelligent magnetic stirrer.
- A variety of measurement modes for different requirements, including stable display mode, auto. hold mode, auto. data logging mode, and dial mode
- USB data output for printing and further analysis, auto. data logging in the 9500 PC-Link desktop software.
- PC9500 meter can measure and display pH & conductivity value at same time.

1.3 Features of pH Measurement

- 1 to 5 points of automatic calibration with calibration instruction and automatic checking functions.
- Automatically recognize pH buffer solution. 3 series buffer solution selectable: USA series, NIST series and CH series, as well as User-Define solutions (any pH standard solutions).
- pH high/low value alarm function

1.4 Features of Conductivity Measurement

- 1 to 4 points of automatic calibration with calibration instruction and automatic checking functions.
- Automatically recognize conductivity standard solutions. 2 series standard solution available: Standard Series and CH Series, as well as User-Define solution (any conductivity standard solutions).
- Measurement modes include conductivity, TDS, salinity, and resistivity.

2 Technical Specifications

2.1 Technical Parameters

	Technical Parameters		Applicable Models
pH	Range	-2.000 to 20.000 pH	PH9500 PC9500
	Resolution	0.1/0.01 /0.001pH	
	Accuracy	±0.002 pH ±1 digit	
	Temp. Compensation Range	0 to 100°C (auto. or manual)	
	Calibration Points	1 to 5 points	
	Buffer Series Options	USA, NIST, CH, and User-Define	
mV	Range	±2000.0mV	
	Resolution	0.1mV	
	Accuracy	±0.03% F.S ±1 digit	
Conductivity	Range	0.00 µS/cm to 2000 mS/cm	EC9500 PC9500
	Resolution	0.01/0.1/1µS/cm; 0.01/0.1/1 mS/cm	
	Accuracy	±0.5% F.S ±1 digit	
	Temp. Compensation Range	0 to 50°C (auto. or manual)	
	Cell Constant	0.1/1/10 cm^{-1}	
	Reference Temp.	15 to 30°C (adjustable)	
	Temp. Compensation Coefficient	0.00 to 10.00% (adjustable)	
	Calibration Points	1 to 4 points	
	Standard Series Options	Standard, CH, User-Define	
TDS	Range	0.00 mg/L to 1000 g/L	EC9500 PC9500
	Resolution	0.01/0.1/1mg/L; 0.01/0.1/1 g/L	
	Accuracy	±1.0% F.S ±1 digit	
	Temp. Compensation Range	0 to 50°C (auto. or manual)	
	TDS Factor	0.40 to 1.00 (adjustable)	

Salinity	Range	0.00 to 100 ppt	EC9500 PC9500
	Resolution	0.01/0.1 ppt	
	Accuracy	±1.0% F.S ±1 digit	
	Temp. Compensation Range	0 to 50°C (auto. or manual)	
	Salinity Type	Linear / NaCl / Saltwater	
Resistivity	Range	0.00 Ω·cm to 100MΩ·cm	EC9500 PC9500
	Resolution	0.1/1 Ω·cm; 0.01/0.1/1KΩ·cm; 0.1 MΩ·cm	
	Accuracy	±1.0% F.S ±1 digit	
	Temp. Compensation Range	0 to 50°C (auto. or manual)	
Temperature	Range	-10.0 to 110.0°C; 14.0 to 230°F	PH9500 EC9500 PC9500
	Resolution	0.1°C; 0.1/1°F	
	Accuracy	±0.5°C±1 digit	

2.2 Others

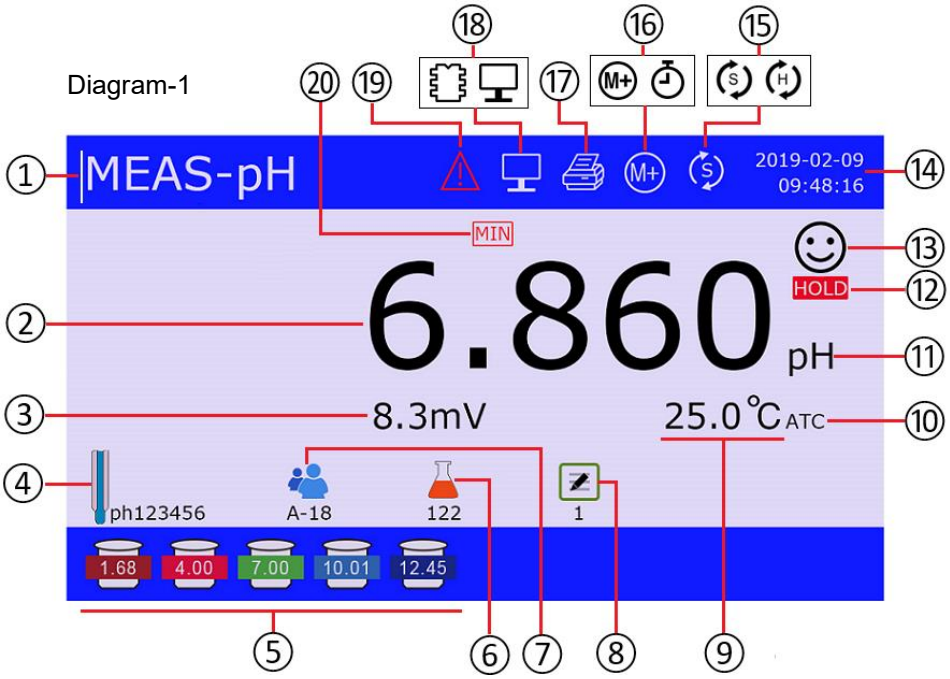
Data Storage	PH9500/EC9500: 1000 groups; PC9500: 2000 groups
Power Supply	DC9V/600mA
Dimensions and Weight	Meter: (360×235×100) mm / 1.7kg

3 Meter Illustration

3.1 Main Interface

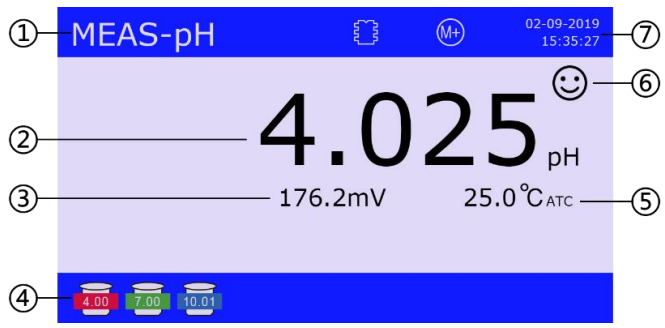
Diagram-1 is the complete pH measurement interface.

Diagram-1



①	Measurement Mode	⑪	Measurement Unit
②	pH Measurement	⑫	Auto. Hold
③	mV value of pH electrode	⑬	Stable reading
④	Electrode ID	⑭	Date and time
⑤	Completed calibration(s)	⑮	Current stirring speed; Saved stirring speed
⑥	Sample ID	⑯	Manual data log; Auto. data log
⑦	User ID	⑰	Printer
⑧	Used data storage	⑱	Meter memory; PC
⑨	Temperature value and unit (°C°F)	⑲	Calibration reminder
⑩	Temperature compensation: ATC – Automatic Temperature Compensation; MTC – Manual Temperature Compensation	⑳	Alarms of readings exceeding min/max values

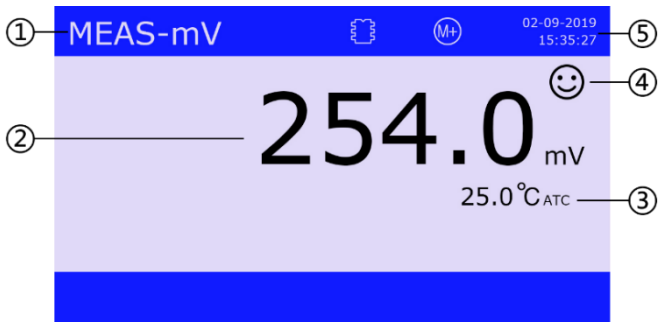
3.2 Measurement Interfaces



pH Measurement Interface

applicable models: PH9500/PC9500

①-- pH measurement mode
②-- pH measurement
③-- mV value of pH electrode
④-- completed pH calibration(s)
⑤-- Temperature measurement
⑥-- Stable reading
⑦-- Date and time



mV (ORP) *Measurement Interface*

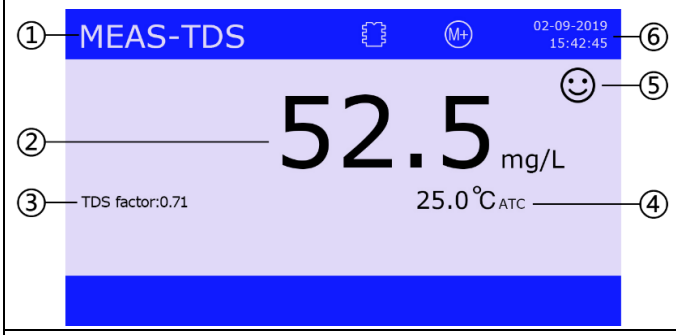
applicable models: PH9500/PC9500

①-- mV measurement mode
②-- mV measurement
③-- Temperature measurement
④-- stable reading
⑤-- Date and time

Conductivity Measurement Interface

applicable models: EC9500/PC9500

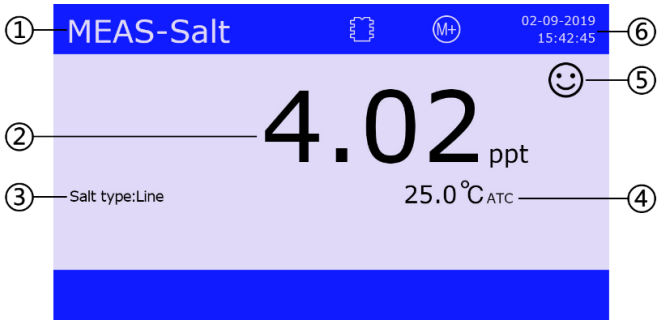
①-- Conductivity measurement mode
②-- Conductivity measurement
③-- Conductivity parameters (see section 7.1.2, 7.2.5, 7.2.6)
④-- Completed conductivity calibration(s)
⑤-- Temperature measurement
⑥-- Stable reading
⑦-- Date and time



TDS Measurement Interface

applicable models: EC9500/PC9500

①-- TDS measurement mode
②-- TDS measurement
③-- TDS conversion factor (see section 7.7)
④-- Temperature measurement
⑤-- Stable reading
⑥-- Date and time



Salinity Measurement Interface

applicable models: EC9500/PC9500

①-- Salinity measurement mode
②-- Salinity measurement
③-- Salinity type (see section 7.8)
④-- Temperature measurement
⑤-- Stable reading
⑥-- Date and time

Resistivity Measurement Interface

applicable models: EC9500/PC9500

①-- Resistivity measurement mode
②-- Resistivity measurement
③-- Temperature measurement
④-- Stable reading
⑤-- Date and time

pH/Conductivity Measurement Interface

applicable models: PC9500

①-- pH/conductivity measurement mode
②-- pH stable reading
③-- pH measurement
④-- Temperature for pH
⑤-- Completed pH calibration(s)
⑥-- Completed conductivity calibration(s)
⑦-- Temperature for conductivity
⑧-- Conductivity measurement
⑨-- Conductivity stable reading
⑩-- Date and time

3.3 Keypad

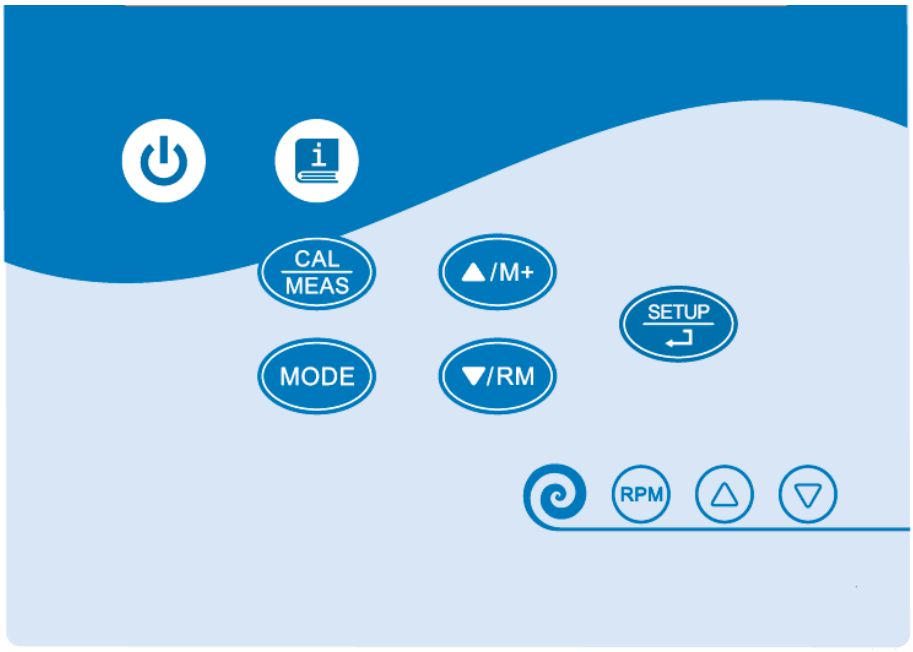


Diagram-2

3.3.1 Keypad Operation

Short press – Press key and hold for less than 2 seconds, buzzer makes a beep;
Long press – Press key and hold for more than 2 seconds, buzzer makes a beep when short pressing the button, another beep will ring after holding the key for 2 seconds.

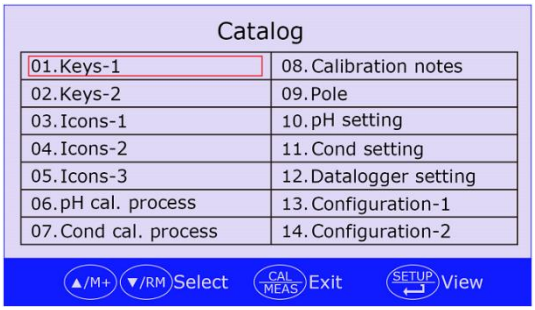
Table-1 Keypad Operation and Functions

Key	Operation	Functions
⏻	Short press	● Power on/off
MODE	Short press	Press to switch among different measurement modes： • PH9500:pH→mV • EC9500: Conductivity→TDS→Salinity→Resistivity • PC9500: pH→mV→Conductivity→TDS→Salinity→pH/conductivity
	Long press	● Enter manual temperature compensation
CAL MEAS	Long press	● In measurement mode, press to enter calibration
	Short press	● End all current operations and go back to measurement mode

SETUP	Short press	• In measurement mode: press to enter parameter set-up main menu; • In calibration mode: press to perform calibration; • In main menu: press to enter submenu; • In submenu: press to enter parameter set-up; • In parameter set-up mode: press to confirm parameter; • In manual temperature compensation: press to confirm temperature value.
▲/M+ ▼/RM	Short press	• In measurement mode: press ▲/M+ key to store measurements, • press ▼/RM key to recall saved data; • In recall (RM) mode: press ▲/M+ or ▼/RM key to turn pages; • In menu mode: press key to select items; • In manual temperature compensation: press to change temperature value, hold the key for fast changing.
	Short press	• Check quick guide
	Short press	• Turn on/off magnetic stirrer
RPM	Long press	• Save the current stirring speed
	Short press	• Switch between current speed and the saved speed
△ ▽	Short press	• Press to change stirring speed. Hold the key to change speed quickly.

3.3.2 Function

Press key to check the quick user guide of the meter, including keypad operation information, icon information, calibration illustration, calibration notes, electrode maintenance, parameter settings, etc. Diagram-3 is the index of content, which is only in English or Simplified Chinese.



3.3.3 Manual temperature compensation

When no temperature probe is connected to the meter, long press MODE to enter manual temperature compensation mode. Press ▲/M+ or ▼/RM to adjust temperature value. Hold the key to quickly change values. Short press SETUP to confirm and go back to measurement mode.

3.4 Meter Sockets

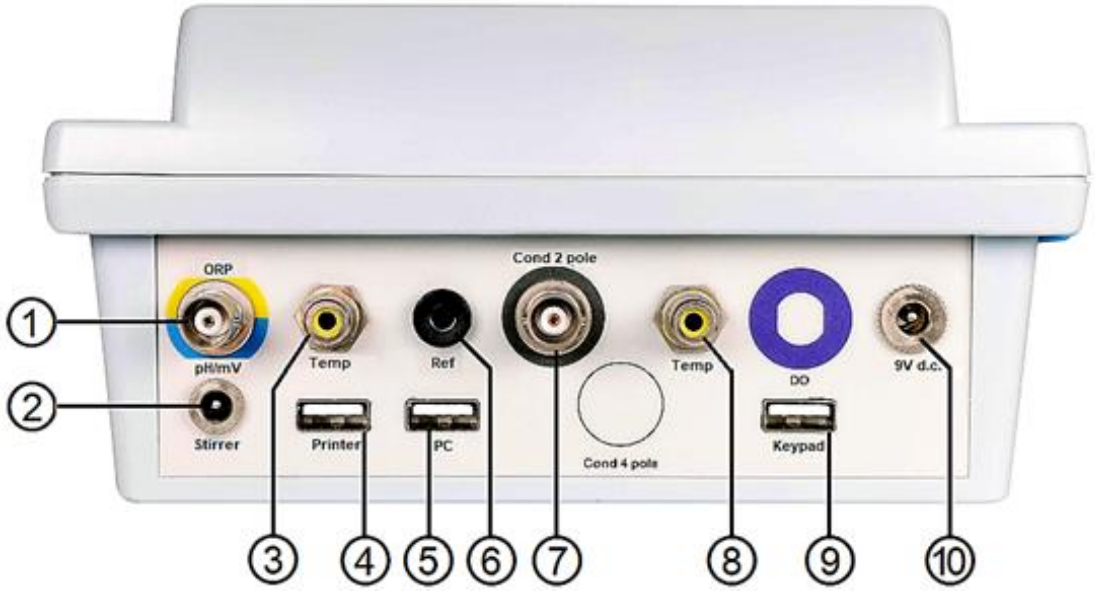
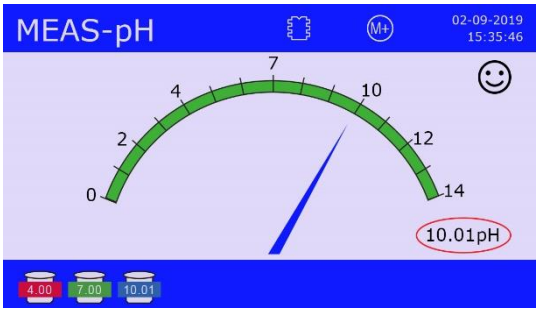
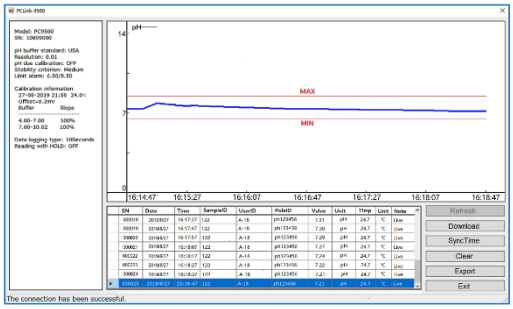


Diagram-4

Table - 2 Meter Sockets Information

	Socket Type	Information
①	BNC	Connect pH or ORP combination electrode
②	Φ2 power supply	Connect magnetic stirrer
③	RCA	Connect temperature sensor (for pH)
④	USB	Connect printer
⑤	USB	Connect PC
⑥	Φ4 banana	Connect reference electrode
⑦	BNC	Connect conductivity electrode
⑧	RCA	Connect temperature sensor (for conductivity)
⑨	USB	Connect keyboard
⑩	Φ2.5 power supply	Connect DC9V adaptor

3.5 Reading Mode

3.5.1 Stable Reading Mode When reading is stable, ☺ shows up. If you don't see the smiley face or it's flashing, it means the reading is not fully stabilized and it's not the right timing to record or calibrate.	
3.5.2 Auto. Hold Mode Choose "on" in parameter setting 4.6 to turn on Auto. Hold mode. When ☺ stays on for more than 10 seconds, the reading will be automatically locked, and **HOLD** icon will show up. Short press CAL MEAS to unlock.	
3.5.3 pH dial display mode Turn on the pH dial display mode in parameter setting 1.7. This mode is featured with a vivid, stable, and continuous display. The bottom right is the digital value.	
3.5.4 Auto. timing mode Setup auto. timing data logger in parameter settings 3.2 to record measurements in long-term. When connected to PC, a measurement curve can be formed in the PC-Link software as shown right.	

Note The icon ☺ will be displayed when the reading gets stabilized, but the measurement will continue. When the measured value changes beyond a certain range, the icon will flash or disappear until it stabilizes again. The stability of the reading is related to many factors:

- Measurement time -- the longer the measurement time, the more stable the ☺ icon will be;
- Nature of the test solution – the solution with low ionic strength (such as distilled or deionized water), or the solution with unstable chemical nature, the measurement will not be easy to stabilize.
- The following three methods will help improve reading stability.
- (a) Turn on Auto. Hold Mode (parameter setting 4.6), refer to section 3.5.2.
- (b) Select the appropriate "pH stability standard" for different test solutions (parameter setting 1.5), refer to section 5.6.1.
- (c) Select the right pH electrode for each specific application, see section 10.

3.6 Meter Installment

3.6.1 Connect Test-Bench

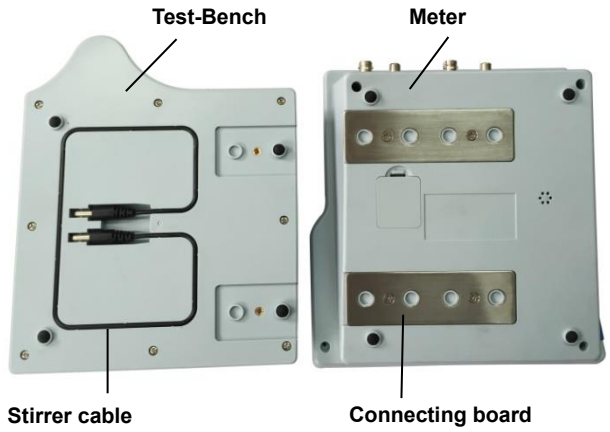
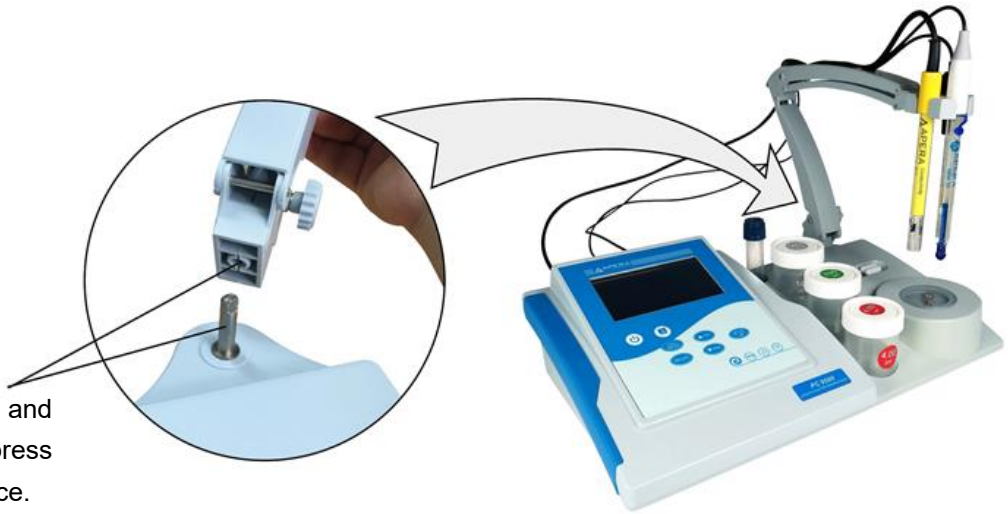
Before installment	After installment
	

Diagram-5

3.6.2 Install flexible electrode holder



Align the hole and bar, then press down with force.

Diagram-6

3.6.3 How to use Test-Bench

(a) Use in a connected manner

(b) Use in a separated manner

Diagram-7

3.7 Magnetic Stirrer Operation

3.7.1 *Technical Specifications*

Speed Range	0 to 2300 RPM (no load)
Working area diameter	Φ100mm
Max. stirring volume	1000mL

3.7.2 *Operation*

(a) Insert the stirrer cable to the corresponding sockets in meter and stirrer.

(b) Short press to power on stirrer, will show up on the top of the display. Press or to adjust stirring speed. Short press the key to adjust slowly; Hold the key to adjust quickly. Icon indicates that the stirrer is powered on and it's stirring at the current speed.

(c) How to use RPM: After stirring speed is adjusted, hold RPM for about 3 seconds until the buzzer makes a beep. The adjusted speed is now saved. Next time, if you want to use this saved speed, just short press RPM, and icon will show up on top.

(d) Switch between two speeds: After saved speed and current speed are adjusted, short press RPM again to alternate between the saved speed ( ) and the current speed ( )

3.7.3 *Notes*

- If the bottom surface of the beaker is not flat, it will vibrate or even stop stirring. In this case, replace a more qualified beaker.
- At zero speed, do not hold RPM button, otherwise zero speed will be stored. If this is the case, just re-adjust the speed and store it by holding RPM again.

4 Meter Setup

4.1 Setup before Use

Before first-time use, please check the following settings and make adjustments: temperature unit, date format, date, time, system language, pH resolution, pH buffer series, conductivity standard series, etc. For details, refer to section 4.3.

4.2 Screen Display Setup

In parameter settings 4.5, choose Simple or Complete display mode. Complete display mode includes electrode ID, user ID, and sample ID as shown in Diagram-8 (b). For setting up ID, refer to section 8.3.3-(c).

(a) Simple Display

(b) Complete Display

Diagram-8

4.3 Parameter Settings

4.3.1 *Main Menu and Sub-menu*

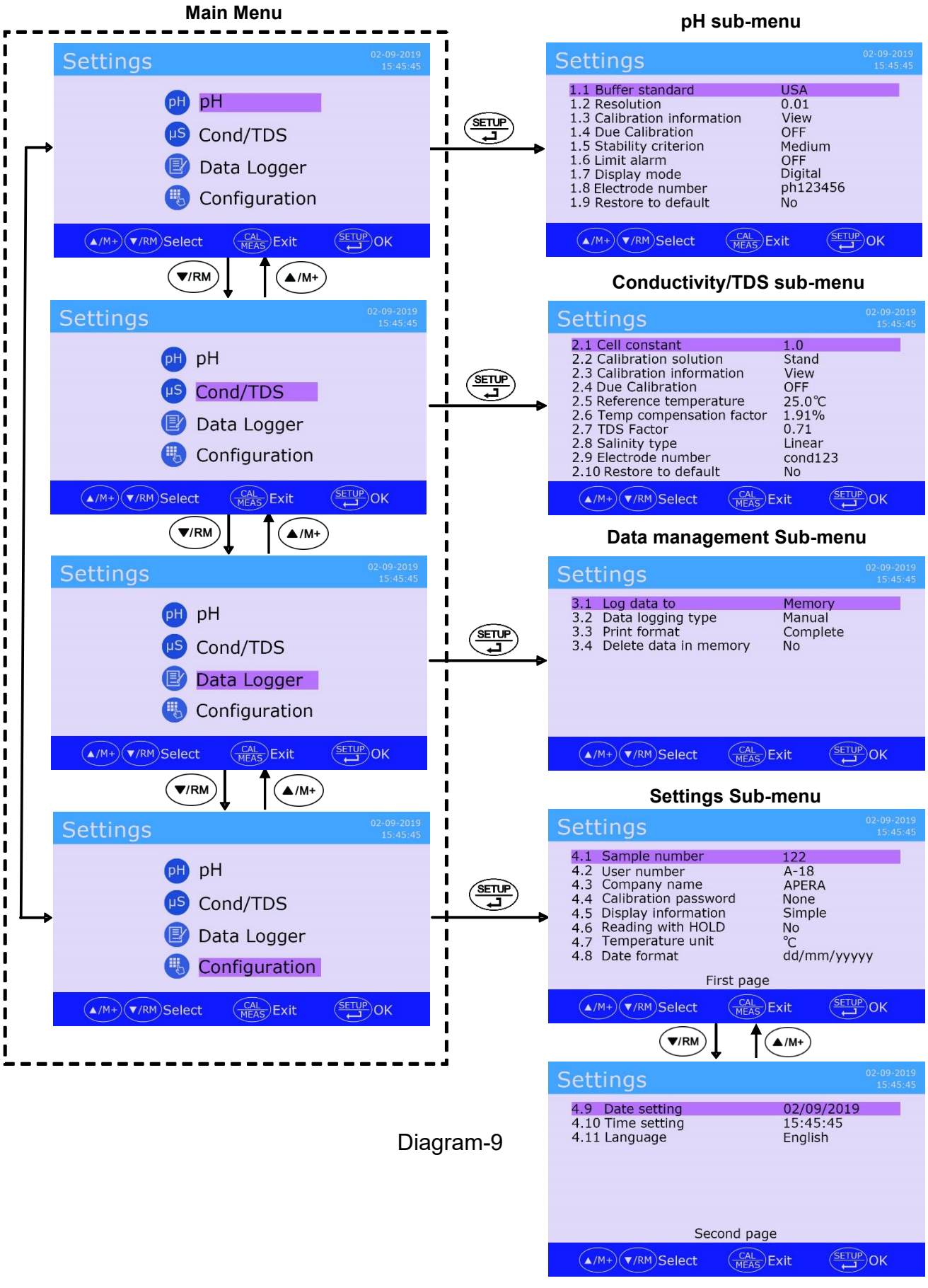


Diagram-9

4.3.2 Operation

For detailed operation, please follow the instruction at the bottom of screen.

4.3.3 Parameter Settings Content

Main Menu	#	Parameter	Settings Content	Default	Info
pH	1.1	pH buffer standard	USA/NIST/CH/User-Define	/	Refer to section 5.1.1
	1.2	Resolution	0.001/0.01/0.1	0.01	/
	1.3	Calibration info	View/Print	Check	Refer to section 5.1.4
	1.4	Calibration reminder	Off/Hour/Day	Off	Refer to section 5.1.5
	1.5	Stability standard	Low/Medium/High	Medium	Refer to section 5.6.1
	1.6	Max/min reading alarm	Off/Max/Min	Off	Refer to section 5.6.2
	1.7	Display mode	Digital/Dial	Digital	Refer to section 3.5.3
	1.8	Electrode ID	---------	/	Refer to section 8.3.3-(c)
	1.9	Back to factory default	No/Yes	No	Refer to section 5.6.4
Cond./ TDS	2.1	Cell constant	10/1.0/0.1	1.0	Refer to section 7.1.2
	2.2	Calibration solution standard	CH/Standard/User-Define	/	Refer to section 7.2.1
	2.3	Calibration info	Check/Print	Check	Refer to section 7.2.3
	2.4	Calibration reminder	Off/Hour/Day	Off	Refer to section 7.2.4
	2.5	Reference temp.	15 to 30°C	25°C	Refer to section 7.2.5
	2.6	Temp. compensation coefficient	0.00 to 10.0%	2.00%	Refer to section 7.2.6
	2.7	TDS factor	0.40 to 1.00	0.71	Refer to section 7.7
	2.8	Salinity type	Linear/NaCl/Saltwater	Linear	Refer to section 7.8
	2.9	Electrode ID	---------	/	Refer to section 8.3.3-(c)
	2.10	Back to factory default	No/Yes	No	Refer to section 7.6.4
Data	3.1	Logging data to	Memory/Printer/PC	/	Refer to section 8.2.1/8.3.1.
	3.2	Logging mode	Manual/Auto.	/	Refer to section 8.2.3
	3.3	Printing format	Simple/Complete	/	Refer to section 8.3.3(a)to(b)
	3.4	Delete data in memory	Yes/No	/	Refer to section 8.2.4-(d)
Settings	4.1	Sample ID	---------	/	Refer to section 8.3.3-(c)

	4.2	User ID	---------	/	Refer to section 3.3.3-(c)
	4.3	Company name	---------	/	Refer to section 8.3.3-(c)
	4.4	Calibration password	---------	/	Refer to section 4.4
	4.5	Display info	Simple/Complete	/	Refer to section 4.2
	4.6	Auto. Hold	On-Off	/	Refer to section 3.5.2
	4.7	Temperature unit	°C - °F	/	/
	4.8	Date format	YYYY-MM-DD/MM-DD-YYYY/DD-MM-YYYY	/	/
	4.9	Date setting	---	/	/
	4.10	Time setting	---	/	/
	4.11	Language	Chinese-English-German-Spanish-French-Italian	/	/

4.4 Calibration Password

- The factory setting of the calibration password is “None” and the initial password is 000000. To set the calibration password, connect the keyboard, enter parameter setting 4.4, press SETUP key, and then enter the initial password twice as prompted;
- To set the new password, enter the old password first, then enter the new password twice. The password is up to 8 English letters or numbers;
- Cancel password: Enter the old password in parameter setting 4.4 and press SETUP key to confirm, then ignore the prompt to enter the new password, just press SETUP key twice to cancel password.
- There is a confidential envelope comes with the meter that has a set of “super password”. Please make sure to properly save it. In case you have forgotten your password, you can use this super password to unlock it, or contact your supplier.

5 pH Measurement

5.1 About pH Calibration

5.1.1 Standard pH Calibration Buffer Solutions

The meter has 3 series of standard pH buffers: USA, NIST, and CH; plus user-define buffers. Users can make the selection in parameter setting 1.1 (buffer solution standard). The 3 standard series are as shown in Table-3. For User-define buffers, refer to section 5.3.

Table-3 pH Standard Buffer Series

Calibration Icon		pH Standard Buffer Series		
		USA	NIST	CH
5-point Calibration		1.679 pH	1.680 pH	1.680 pH
		4.005 pH	4.003 pH	4.003 pH
		7.000 pH	6.864 pH	6.864 pH
		10.012 pH	9.182 pH	9.182 pH
		12.454 pH	12.454 pH	12.460 pH

Note: the calibration icons are examples of USA standard series. In practice, these icons will change according to the series selected by users.

5.1.2 5-point Calibration

Users can choose 1 to 5 points of calibration. The 1st point of calibration must be 7.00 pH (or 6.86 pH in NIST and CH Series). Then choose other buffers to calibrate 2nd point to 5th point. There are a variety of combos of calibration points. The most commonly used combos are the 3-point one: 4.00 pH, 7.00 pH, 10.01 pH, and the combos that are suitable for strong acid/alkaline samples as shown in Table-4. Generally, make sure the estimated pH range of your sample solutions falls in the two points of calibration.

Table-4 Commonly Used Calibration Combo (Take USA Series as an example)

	USA Series	Calibration Icons	Applicable Scenarios
1-pt calibration	7.00pH		accuracy≥±0.1pH
2-pt calibration	7.00pH and 4.00pH		<7.00 pH
	7.00pH and 10.01pH		>7.00 pH
	7.00pH and 1.68pH		Strong acid samples
	7.00pH and 12.45pH		Strong alkaline samples
3-pt calibration	7.00pH, 4.00pH, and 10.01pH		0 to 14.00pH

5.1.3 *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 measurement (≤ ±0.02pH), the meter should be calibrated before test every time; For general-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 before next use:

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 alkaline (pH>12) solutions.
c) After measuring fluoride-containing solution and strong organic solution.
d) There is a significant temperature difference between the test sample and the buffer solution.

5.1.4 *Check calibration record*

In parameter setting 1.3 (Calibration info), users can choose to view or print. When choosing "view", press SETUP to display the last calibration record as shown in Diagram-10. When choosing "print", press SETUP to print out the last calibration data (the meter's data logging mode must be in printer mode, and the printer's status must be online. Refer to section 8.3.4 for details).

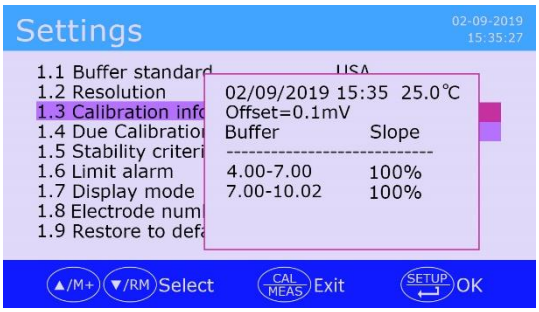


Diagram-10

5.1.5 *pH Calibration Reminder*

Users can set up pH calibration reminder in parameter setting 1.4. When time is due, the red reminder icon will show up as shown in Diagram-11. This will not affect the normal operation of the meter. After calibration or choosing none in parameter setting 1.4, the reminder icon will disappear.

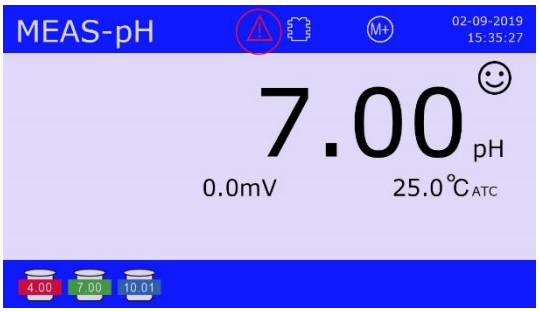


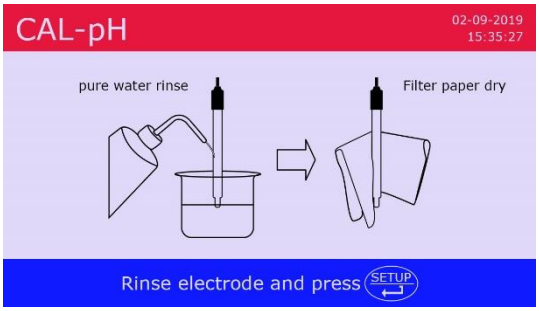
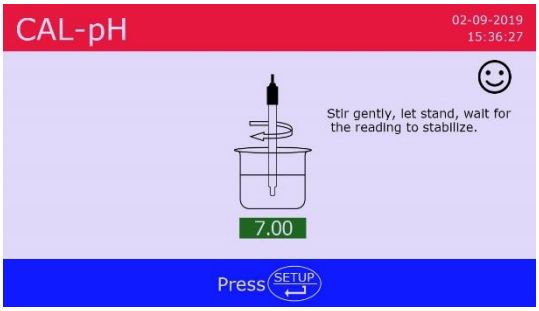
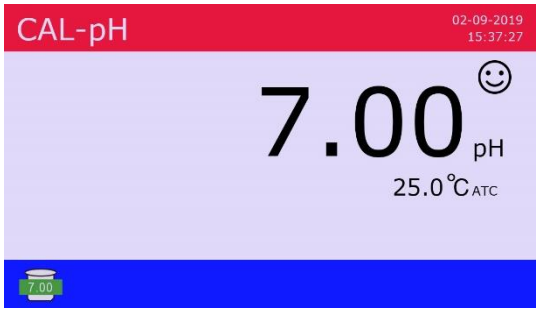
Diagram-11

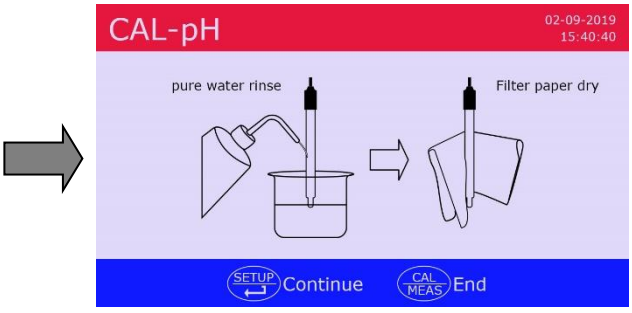
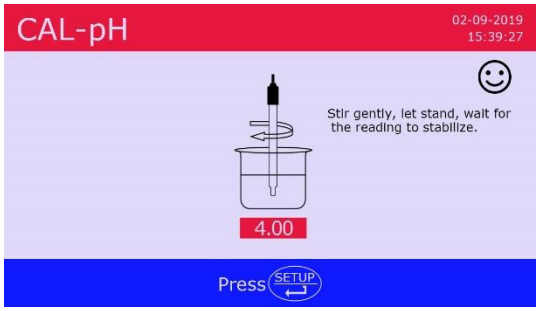
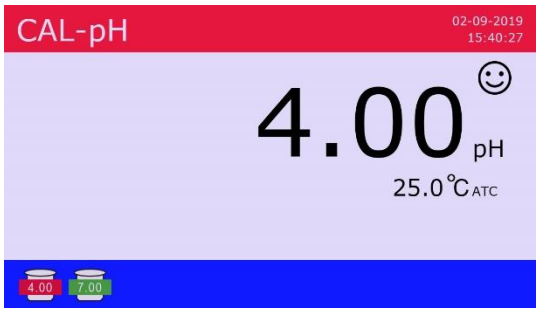
5.2 pH Meter Calibration

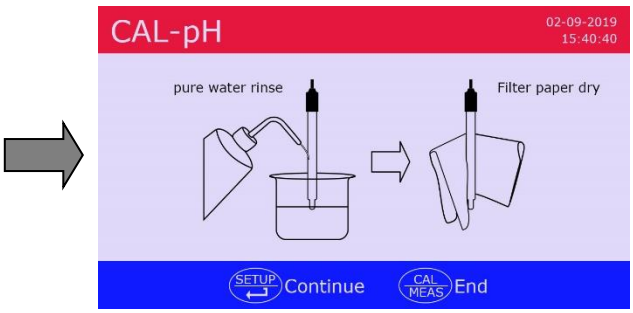
The following calibration process takes 4.00 pH, 7.00 pH, and 10.01 pH as an example. Put LabSen 211 pH Combination Electrode and MP500 temperature electrode on the flexible electrode holder and connect to the meter.

Note: the electrode mentioned in Table-5 and Table-6 refers to pH combination electrode and temperature electrode.

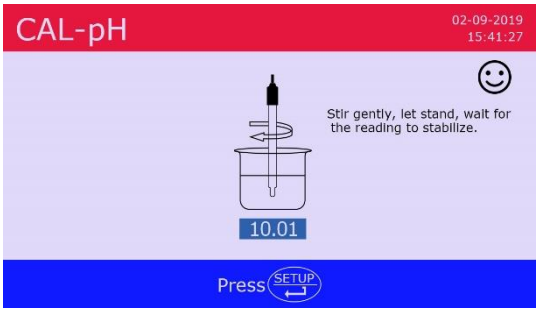
Table-5　pH Meter 3-point Calibration

<table>
<tr>
<td> 
</td>
<td>1. Long press SETUP enter calibration mode. Rinse off the electrode with distilled or deionized water. Shake-dry or dry with filter paper. Then insert the electrode into 7.00 pH buffer. Press CAL MEAS to continue.</td>
</tr>
<tr>
<td> 
</td>
<td>2. Stir the electrode gently, let it stand in 7.00 pH buffer, and wait for ☺ to show up and stay on screen (the buzzer will make a beep). Then press SETUP to complete the 1st point calibration.</td>
</tr>
<tr>
<td colspan="2"> 

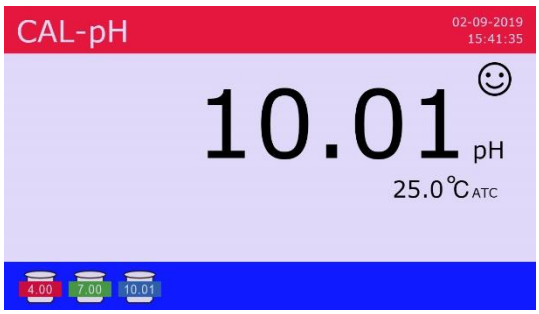

</td>
</tr>
<tr>
<td colspan="2">3. When pH 7.00 is calibrated, the 7.00 icon will show up at the bottom left corner. The meter will automatically enter the next point of calibration. Rinse off the electrode with distilled or deionized water. Shake-dry or dry with filter paper. Then insert the electrode into 4.00 pH buffer. Press SETUP to continue.</td>
</tr>
<tr>
<td> 
</td>
<td>4. Stir the electrode gently, let it stand in 4.00 pH buffer, and wait for ☺ to show up and stay on screen (the buzzer will make a beep). Then press SETUP to complete the 2nd point calibration.</td>
</tr>
<tr>
<td colspan="2"> 

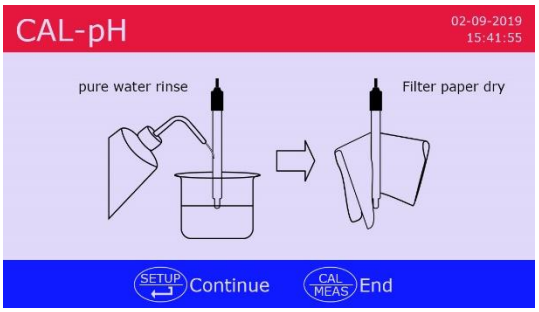

</td>
</tr>
</table>

5. When pH 4.00 is calibrated, the 4.00 icon will show up at the bottom left corner. The meter will automatically enter the next point of calibration. Rinse off the electrode with distilled or deionized water. Shake-dry or dry with filter paper. Then insert the electrode into 10.01 pH buffer. Press SETUP to continue.

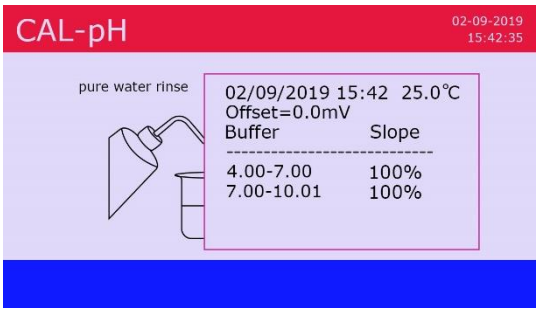


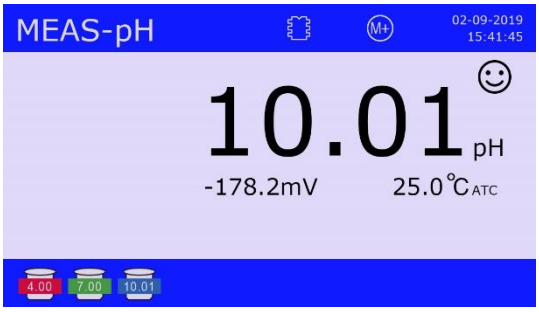
6. Stir the electrode gently, let it stand in 10.01 pH buffer, and wait for ☺ to show up and stay on screen (the buzzer will make a beep). Then press SETUP to complete the 3rd point calibration.





7. When pH 10.01 is calibrated, the 10.01 icon will show up at the bottom left corner. The meter will automatically enter the next process. Now the 3-point calibration is completed. Press CAL MEAS to exit calibration mode.





8. The meter will automatically go back to measurement mode after displaying calibration data for a few seconds.

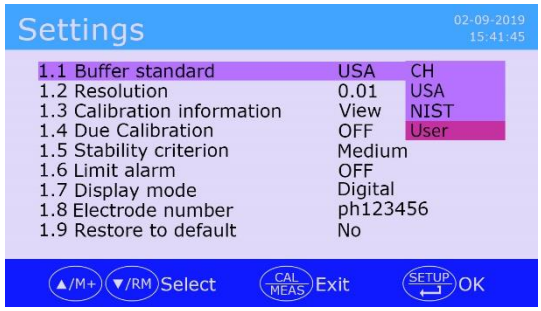
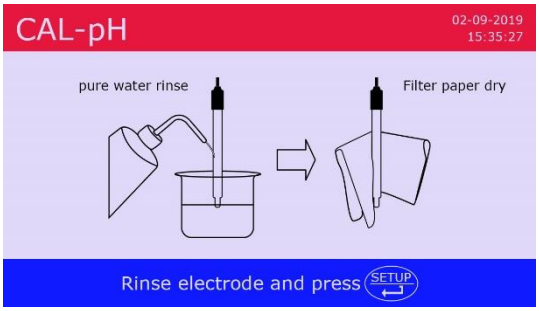
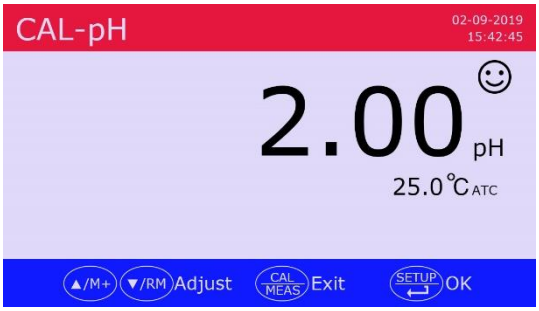
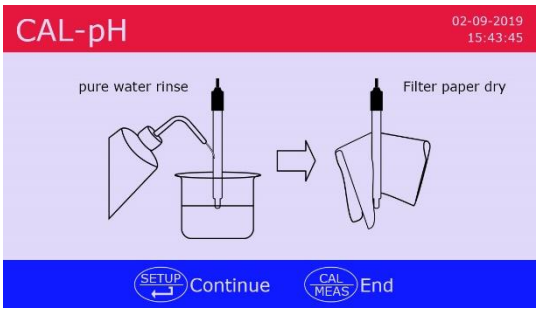
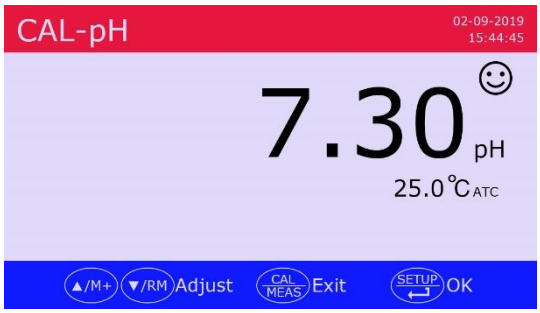
Notes

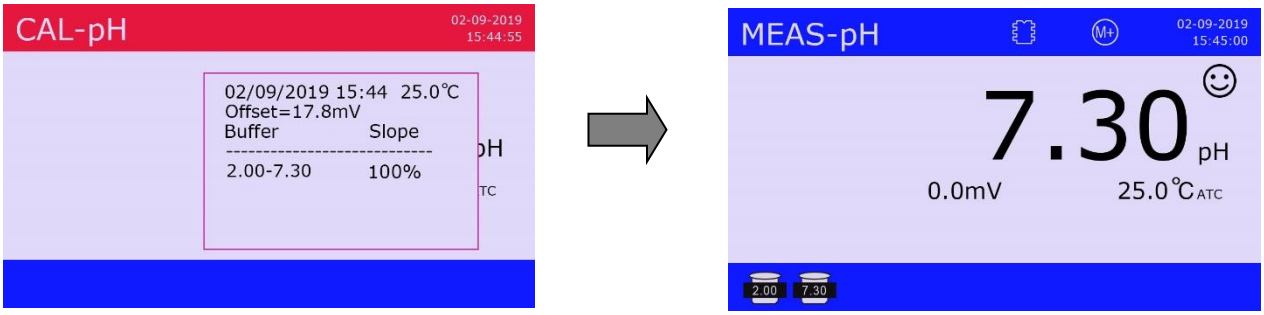
a) The meter can perform 1 to 5 points of calibration. After all 5 points are calibrated, the meter will automatically display calibration record and go back to measurement mode; if it's 1 to 4 points calibration, after completing any point, press CAL MEAS to go back to measurement mode.

b) The meter can automatically recognize pH buffers. During calibration, if the buffer is incorrect, pH electrode is not submerged in solution, or operation is incorrect, the buzzer will make a beep and display self-diagnosis information. For details, refer to Table-7.

5.3 User-Define Calibration (take 2.00 pH and 7.30 pH as an example)

Table-6 pH Meter User-Define Calibration

	1. In parameter setting 1.1, select User, press CAL MEAS to confirm. Then press SETUP to go back to measurement mode.
	2. Long press CAL MEAS to enter calibration mode. Rinse off the electrode with distilled or deionized water. Shake-dry or dry with filter paper. Press SETUP to continue.
	3. Insert the electrode to 2.00 pH solution, stir gently and let it stand. Wait for ☺ to stabilize, press ▲/M+ or ▼/RM to adjust the measurement value to 2.00. Then press SETUP to complete calibration.
	4. After 2.00 pH is calibrated, the meter automatically enters the next point of calibration. Rinse off the electrode with distilled or deionized water, shake-dry or dry with filter paper. Press SETUP to continue.
	5. Insert the electrode to 7.30 pH solution, stir gently and let it stand. Wait for ☺ to stabilize, press ▲/M+ or ▼/RM to adjust the measurement value to 2.00. Then short press SETUP to complete calibration.



6. After 7.30 pH is calibrated, the meter will display calibration record for a few seconds and go back to measurement mode. The calibration icons of 2.00 and 7.30 will show up at the bottom left. Note that in user-define calibration, the icons are in black.

Notes

a) The meter can perform 1 to 2 points of user-define calibration. Press CAL MEAS after the 1st point is completed, the meter will exit calibration mode, which ends up being 1-point user-define calibration.

b) The meter cannot automatically recognize user-define pH buffers, but requires that the difference between two buffers is greater than 1.0 pH. Otherwise self-diagnosis will display error message.

c) pH value of user-define pH buffers is based at certain temperature. We recommend performing calibration and measurement at the same temperature. Otherwise the error could be significant.

d) If it's manual temperature compensation, temperature should be adjusted before calibration. It cannot be adjusted during calibration.

5.4 Self-Diagnosis

The meter has a self-diagnosis function. When the electrode is not working properly, buffers are incorrect, or operation is incorrect, relevant information will pop up at the bottom of the display as shown in Diagram-12. At the same time, the buzzer will make two beeps. For detailed information of self-diagnosis, refer to Table-7.

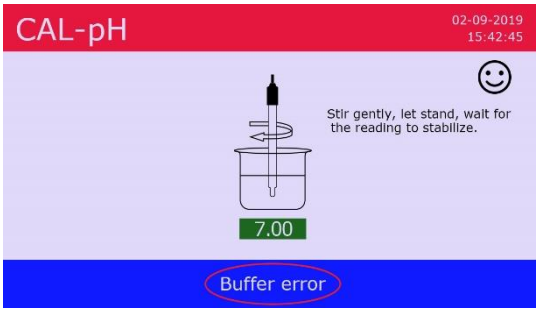


Diagram-12

Table-7 pH Self-Diagnosis Information

Message	Detailed information	How to fix
Buffer error	Incorrect pH buffer, exceeding the meter's recognizable range	1. Check if pH buffer is correct (1st point must be 7.00 or 6.86). 2. Check if pH buffer is in good quality (fresh and clean). 3. Check if electrode is properly connected to meter. 4. Check if electrode is damaged.
Not stable yet	User pressed SETUP before readings are fully stabilized	Press SETUP after ☺ shows up and stays on screen
Electrode Error	Reading hasn't been stabilized for over 3 minutes	1. Check if there is any air bubble inside the glass bulb sensor. If so, shake the electrode with force to remove it. 2. Electrode is aged (more than 1-year of frequent use). Replace the electrode.

5.5 Sample Measurement

Rinse off pH and temperature electrode in distilled or deionized water. Shake-dry or dry with filter paper. Place electrodes into sample solution. Stir them gently, let them stand still, and wait for a stable reading (☺ shows up and stays on screen), which is the measurement you can record. Diagram-13 is the flowchart for pH meter's calibration and measurement.

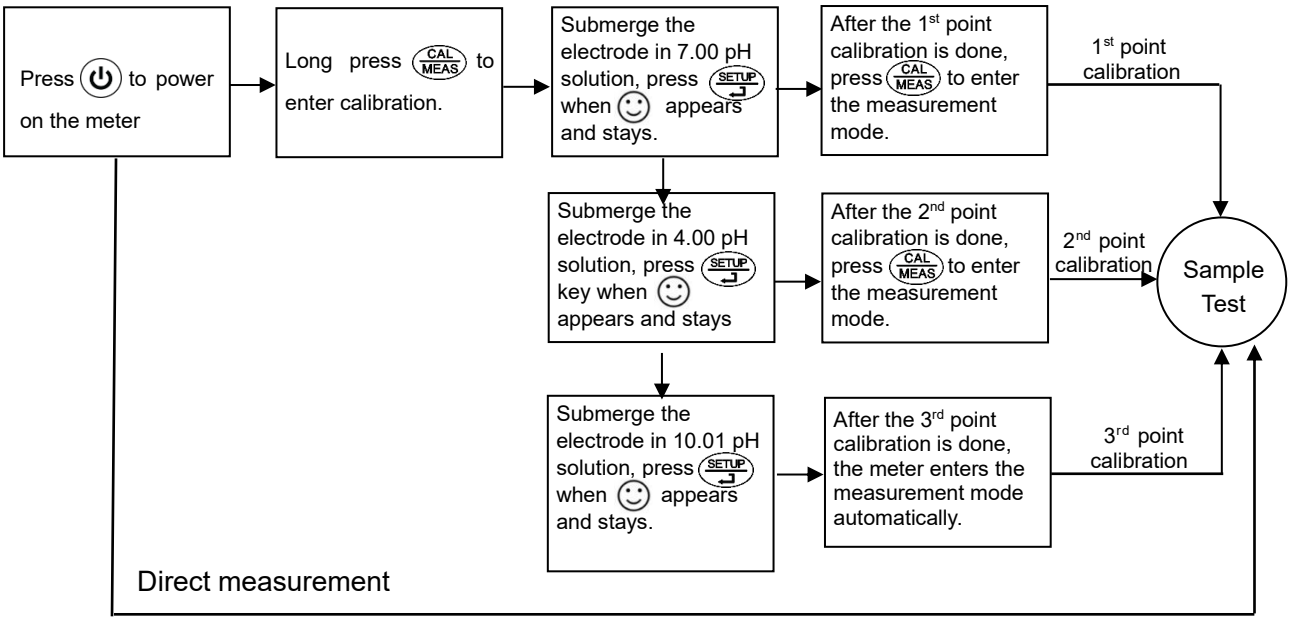


Diagram-13

5.6 About pH Measurement

5.6.1 pH Stability Criterion

pH stability criterion refers to the time it takes for pH readings to stabilize, which is related to the ion concentration (iconic strength) of test samples. Generally, the higher the ion concentration, the faster the readings get stabilized. In parameter setting 1.5, there are options for low, medium, and high. We recommend setting as per Table-8. Factory default is medium.

Table-8

Stability Criterion	Test Samples
Low	Boiler water, steam condensate, deionized water, ultrapure water, etc.
Medium	General water solutions
High	Wastewater

5.6.2 pH Reading Alarm

In parameter setting 1.6, users can setup the pH reading alarm. The alarm range is 0 to 14.00 pH. The alarm icons are MAX (exceeding the preset maximum value) and MIN (exceeding the preset minimum value). At the same time, the buzzer will make a beep. There are four alarm modes available:

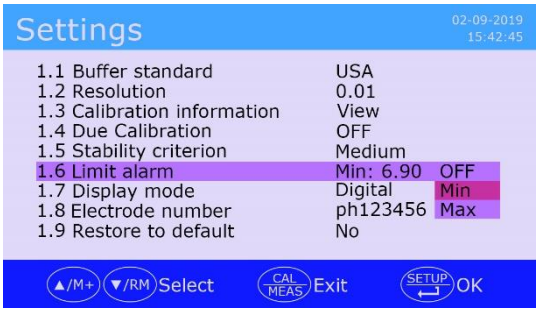


Diagram-14

Diagram-15

◆ No alarm

Set to none and there will be no reading alarm.

◆ Min alarm

If the reading is lower than the minimum value, reading alarm goes off. For example, if minimum value is set to 6.20 pH, when measurement is lower than 6.20 pH, MIN will show up and the buzzer makes a beep. The range of 6.20 to 14.00 is good.

◆ Max alarm

If the reading is higher than the maximum value, reading alarm goes off. For example, if maximum value is set to 8.60 pH, when measurement is higher than 8.60 pH , MAX will show up and the buzzer makes a beep. The range of 0 to 8.60 is good.

◆ Min-Max alarm

If the reading is lower than the minimum value or higher than the maximum value, reading alarm goes off. For example, if minimum value is set to 6.50 pH, and maximum value is set to 7.60 pH, when measurement is lower than 6.50 pH or higher than 7.60 pH, MIN or MAX shows up, and the buzzer makes a beep. The range of 6.50 pH to 7.60 pH is good.

5.6.3 pH Isothermal Measurement Principal

According to pH isothermal measurement principal, the closer the temperature of test samples is to calibration solutions', the higher the measurement accuracy is. Therefore, keeping test samples and calibration solutions at the same temperature is highly recommended.

5.6.4 Back to Factory Default Settings

The meter has the function of restoring factory settings. For details, see parameter setting 1.9 (see Diagram-16). This function will clear all calibration data, return the instrument calibration to the theoretical value (zero potential pH 7.00, slope 100%) and restore some of the function settings to their initial values (see Section 4.4.3 for details). When the instrument calibration or measurement is abnormal, this function can be enabled to restore the instrument to the factory settings before calibration. Restoring the factory settings is irreversible, so please pay special attention when enabling.

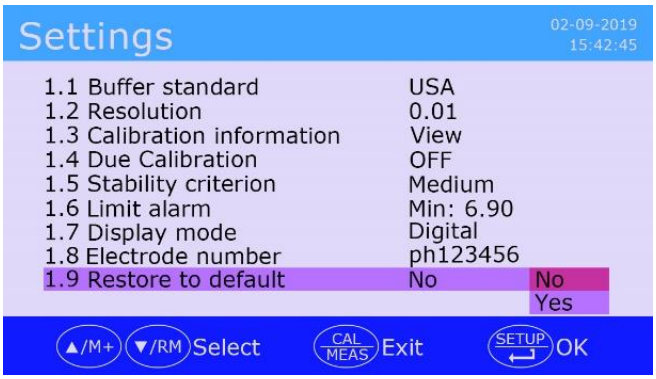


Diagram-16

5.7 pH Electrode Maintenance

5.7.1 Daily Maintenance

The protective vial at the front end of the pH electrode has an appropriate amount of 3M KCl solution (SKU: AI1107), and the electrode tip is immersed therein to maintain the activation of the glass bulb and the junction. When measuring, loosen the cap, pull out the electrode, and wash it with pure water. After use, insert the electrode and screw the bottle cap to prevent the solution from seeping out. If the soaking liquid in the protective vial is found to be turbid and moldy, it should be washed in time and replaced with new soaking solution. The electrode should never be stored in pure water like distilled or deionized water, protein solution or acidic fluoride solution, and should avoid contact with organic grease. Always keep the instrument clean and dry. Pay special attention to keep the meter and electrode socket clean and dry. Otherwise, the measurement will be inaccurate or invalid. If it is stained, it can be cleaned and dried with medical cotton and anhydrous alcohol.

5.7.2 Calibration Solutions

To maximize the meter's measurement accuracy, pH buffers should be fresh and clean. After multiple uses, replace pH buffers in time.

5.7.3 Cleaning

pH electrodes must be thoroughly rinsed with pure water before and after each test. For tough contaminants, users can use a soft brush and warm soap water to clean off. Then rinse with distilled or deionized water and soak the electrode in 3M KCL storage solution overnight before next use. After measurement in viscous samples, the electrode should be rinsed with distilled or deionized water multiple times to remove the adhesion to the glass membrane.

6 mV Measurement

6.1 ORP Measurement

Press the (MODE) to switch the meter to mV measurement mode. Connect the ORP combination electrode (sold separately, SKU: AI1303), insert it into the test sample, stir gently and let it stand still. When ☺ shows up and stays, it is the ORP value. ORP is an abbreviation for "Oxidation-Reduction Potential" and indicates the redox potential of water solution. ORP is a measure of the redox capacity of water solution. The unit is mV.

6.2 ORP Measurement Notes

6.2.1 The instrument does not need to be calibrated during ORP measurement, but if there is any doubt about the test results or the quality of the ORP electrode, ORP standard solutions can be used to test its mV value to determine whether the ORP electrode or instrument is accurate.

6.2.2 Cleaning and activation of ORP electrodes: After long-term use of ORP electrodes, the contamination of the platinum surface may cause measurement inaccuracy and slow response. In this case, the following methods can be used for cleaning and activation:

a) For inorganic contamination, the electrode can be immersed in 0.1 mol/L dilute hydrochloric acid for 30 minutes, rinsed with pure water, and then immersed in the electrode soaking solution for 6 hours.
b) For the contamination of organic oil and oil film, the surface of platinum may be rinsed with soap water, and then immersed in the electrode soaking solution for 6 hours.
c) The platinum surface is heavily polluted, and an oxide film is formed on the surface. The platinum surface can be polished with toothpaste, then rinsed with pure water, and then immersed in the electrode soaking solution for 6 hours.

6.3 ISE Measurement

Connect the ion electrode, insert it in the test sample, stir gently and let it stand. Get the reading when ☺ shows up and stays on screen, which is the potential value of the ion electrode. If the ion electrode is a combination type, simply insert it to the pH/mV socket. If it is not a combination type, users should select a suitable reference electrode and connect it to the REF socket, and the two electrodes must be tested at the same time.

7 Conductivity Measurement

7.1 Conductivity Electrode Information

7.1.1 Default Electrode

The instrument is equipped with 2401T-F conductivity electrode, the cell constant K=1.0, and the built-in temperature sensor enables automatic temperature compensation. The BNC plug of the electrode is connected to the Cond socket; the RCA plug is connected to the Temp socket. After the conductivity electrode is immersed in the solution, it should be stirred for a few times and then placed still to eliminate the bubble interference, so that the reading will be fast and stable.

7.1.2 Conductivity Cell Constant

The meter can be equipped with 3 types of conductivity electrodes: cell constant K=0.1, K=1.0, and K=10.0. The measurement ranges are shown in Table-9. Cell constant setting is in parameter setting 2.1.

Table-9 Cell constant and measurement range

Range	＜20μS/cm	0.5μS/cm to100mS/cm			＞100mS/cm
Cell constant	K=0.1 cm-1	K=1.0 cm-1			K=10 cm-1
Calibration Solution	84μS/cm	84μS/cm	1413μS/cm	12.88mS/cm	111.8mS/cm

7.2 Conductivity Calibration Information

7.2.1 Conductivity Standard Calibration Solutions

The meter supports Standard and CH series conductivity standard calibration solutions, as well as user-define solutions, which can be set up in parameter setting 2.2.

Table-10 Conductivity Standard Calibration Solutions

Icon	Standard Series	CH Series
	84 μS/cm	146.6 μS/cm
	1413 μS/cm	1408 μS/cm
	12.88 mS/cm	12.85 mS/cm
	111.8 mS/cm	111.3 mS/cm

Note: calibration icons are based on Standard series.

7.2.2 ***Calibration Frequency***

a) The meter has been calibrated before leaving factory and can be used directly by the user.

b) It is recommended to calibrate once a month under normal circumstances.

c) If the accuracy requirement is high or the measured temperature is significantly different to the reference temperature (25 °C), it is recommended to calibrate once a week;

d) Test the electrode performance with conductivity standard solutions, and perform calibration when the error is large.

e) It is recommended to perform 3-point or 4-point calibration after a new electrode is used for the first time or after the instrument is restored to the factory default settings. Generally, the calibration solution with the conductivity close to the sample solution can be used for 1 to 2 points of calibration. For example, in the 0 to 20mS/cm conductivity range, use the 1413 μS/cm solution to calibrate.

7.2.3 ***Check Calibration Record***

In the parameter setting 2.3 (calibration information), you can select "View" or "Print". When you select "View", press SETUP to display the last calibration data, as shown in Diagram -17. Press SETUP while selecting "Print" to print out the calibration information, but the instrument's data processing mode must be "printer" and the printer is set to online. See section 8.3.4 for details.

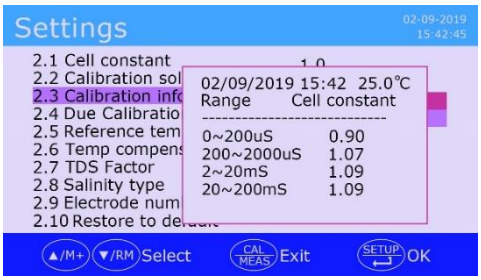


Diagram-17

7.2.4 ***Conductivity Calibration Reminder***

Users can set up conductivity calibration reminder in parameter setting 2.4. When time is due, the red reminder icon will show up as shown in Diagram-18. This will not affect the normal operation of the meter. After calibration or choosing none in parameter setting 1.4, the reminder icon will disappear.

Diagram-18

7.2.5 ***Reference Temperature***

The factory default reference temperature is 25 °C. Other reference temperatures can be set. The setting range is 15 °C to 30 °C, and can be selected in parameter setting 2.5 (reference temperature).

7.2.6 Temperature Compensation Coefficient

The temperature compensation coefficient of the factory setting is 2.00%/°C, but the conductivity temperature compensation coefficients of different kinds and different concentration solutions are different. Users can refer to Table-11 and the data obtained from experiments. Set the setting in 2.6 (temperature compensation coefficient).

Note: When the temperature compensation coefficient is set to 0.00, that is, there is no temperature compensation when the instrument is measuring. The measured value of the instrument is the conductivity value at the solution's temperature at the time.

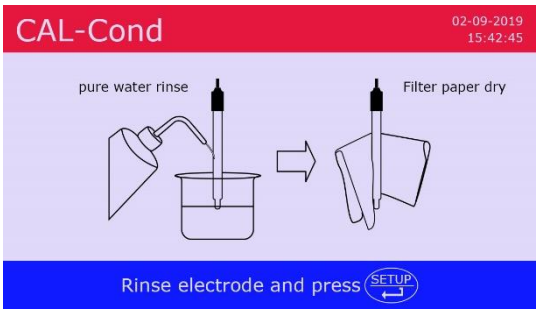
Table-11 Temperature compensation coefficient of special solutions

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

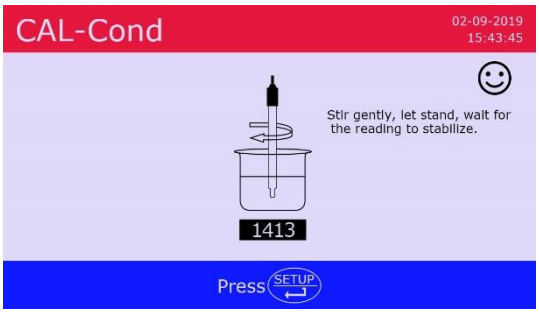
7.2.7 Prevent Contamination of Standard Solutions

The conductivity calibration solution is not buffered. Please take care to prevent contamination when using it. The electrode should be cleaned and dried before being immersed in the calibration solution. In particular, the low concentration 84μS/cm calibration solution should be paid special attention to prevent contamination. The contamination of the calibration solution will affect the accuracy of the calibration.

7.3 Conductivity Meter Calibration (Take 1413μS/cm as an example)

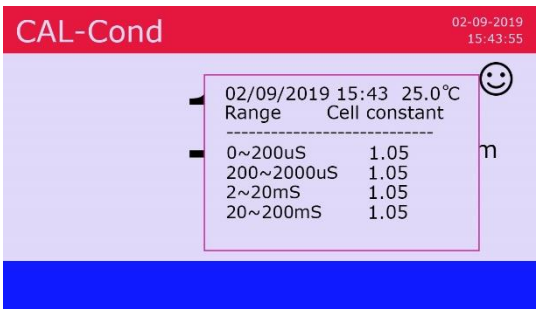


1. Long press CAL/MEAS to enter calibration mode. Rinse off the electrode with distilled or deionized water. Shake-dry or dry with filter paper. Press SETUP to continue.



2. Insert the electrode to 1413μS/cm solution. Stir gently and let it stand still. Wait for ☺ to show up and stay. Then press SETUP to complete calibration.

(a)



(b)

(c)

3. Calibration process
   a) Instrument calibration.
   b) Display calibration data: date, time, temperature, range, and cell constant.
   c) Automatically returns to measurement mode.

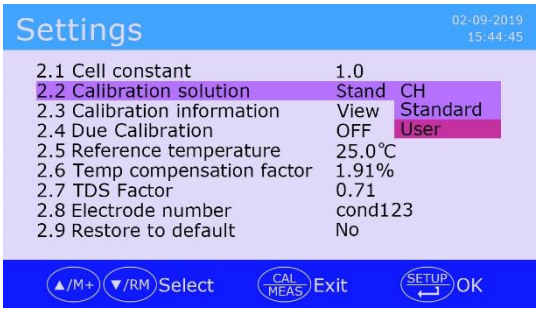
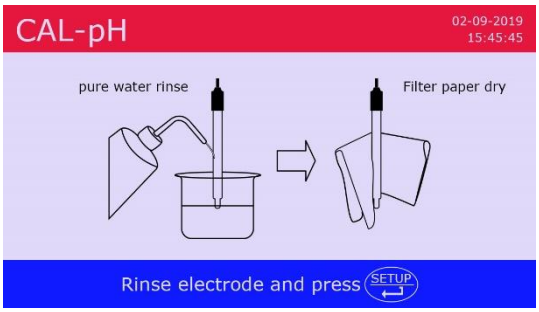
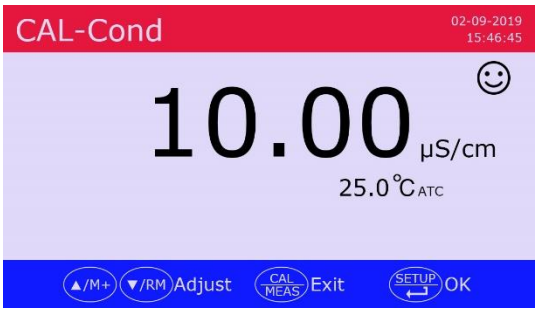
4. Multi-point calibration, exit calibration and switching mode

4.1 Multi-point calibration can be selected as needed. For example, repeat steps 1 to 3 above in 12.88mS solution. Multi-point calibration should be performed according to the concentration of calibration solution from low to high to avoid contamination of low concentration solution. Calibration can also be repeated in the same calibration solution until the displayed values are stable and have good repeatability.

4.2 To exit calibration mode, short press CAL/MEAS.

4.3 Press MODE to switch the measurement mode: conductivity → TDS→ salinity → resistivity.

7.4 User-Define Calibration (Take 10μS/cm as an example)

<table>
<tr>
<td> 
</td>
<td>1. In parameter 2.2, select “user”, press SETUP to confirm. Then press CAL MEAS to return to measurement mode.</td>
</tr>
<tr>
<td> 
</td>
<td>2. Long press CAL MEAS to enter calibration mode. Rinse off the electrode with distilled or deionized water. Shake-dry or dry with filter paper. Press SETUP to continue.</td>
</tr>
<tr>
<td> 
</td>
<td>3. Insert the electrode to 10.00 μS/cm solution, stir gently and let it stand. Wait for ☺ to stabilize, press ▲/M+ or ▼/RM to adjust the measurement value to 10.00. Then press SETUP to complete calibration.</td>
</tr>
<tr>
<td> 
</td>
<td>4. Calibration is completed. The meter returns to measurement mode. 10.00 icon shows up at bottom left.</td>
</tr>
<tr>
<td colspan="2">● Conductivity user-define calibration has only 1-point calibration. User-define calibration has no temperature coefficient or reference temperature. Therefore, it is recommended to perform calibration and measurement at the same temperature. Otherwise, there will be a large error.
● The instrument does not automatically recognize user-define calibration solutions.
● If it's manual temperature compensation, the temperature value should be adjusted before calibration. During calibration, temperature cannot be adjusted.</td>
</tr>
</table>

7.5 Self-Diagnosis

The meter has a self-diagnosis function for conductivity. When the electrode is not working properly, calibration solutions are incorrect, or operation is incorrect, relevant information will pop up at the bottom of the display as shown in Diagram-19. At the same time, the buzzer will make two beeps. For detailed information of self-diagnosis, refer to Table-12.

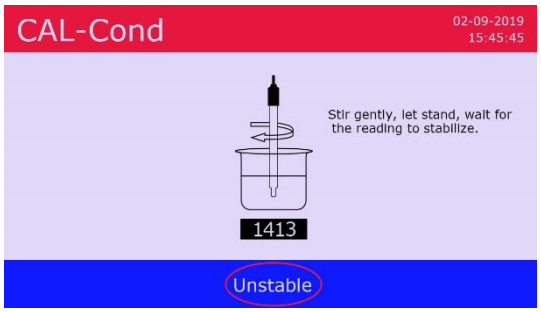


Diagram-19

Table-12 Conductivity Self-Diagnosis

Self-diagnosis Message	Information	How to fix
Solution error	Calibration solution has a problem. The meter cannot recognize it.	1. Check if calibration solution is in good quality (fresh and clean). 2. Check if the electrode is properly connected to the meter. 3. Check if the electrode is damaged.
Not stable yet	User pressed SETUP before the reading is fully stabilized	Press SETUP after ☺ shows up and stays on screen
Electrode error	The reading hasn't been stabilized for over 3 minutes	1. Shake the electrode with force to remove potential air bubbles. 2. Electrode is aged (more than 1-year of frequent use). Replace the electrode.

7.6 Sample Measurement

Rinse the conductivity electrode with distilled or deionized water. Shake-dry or dry with filter paper. Insert it to sample solution, stir a few seconds and let it stand. Record the reading when ☺ shows up and stays on screen. Diagram-20 is the flowchart for conductivity calibration and measurement.

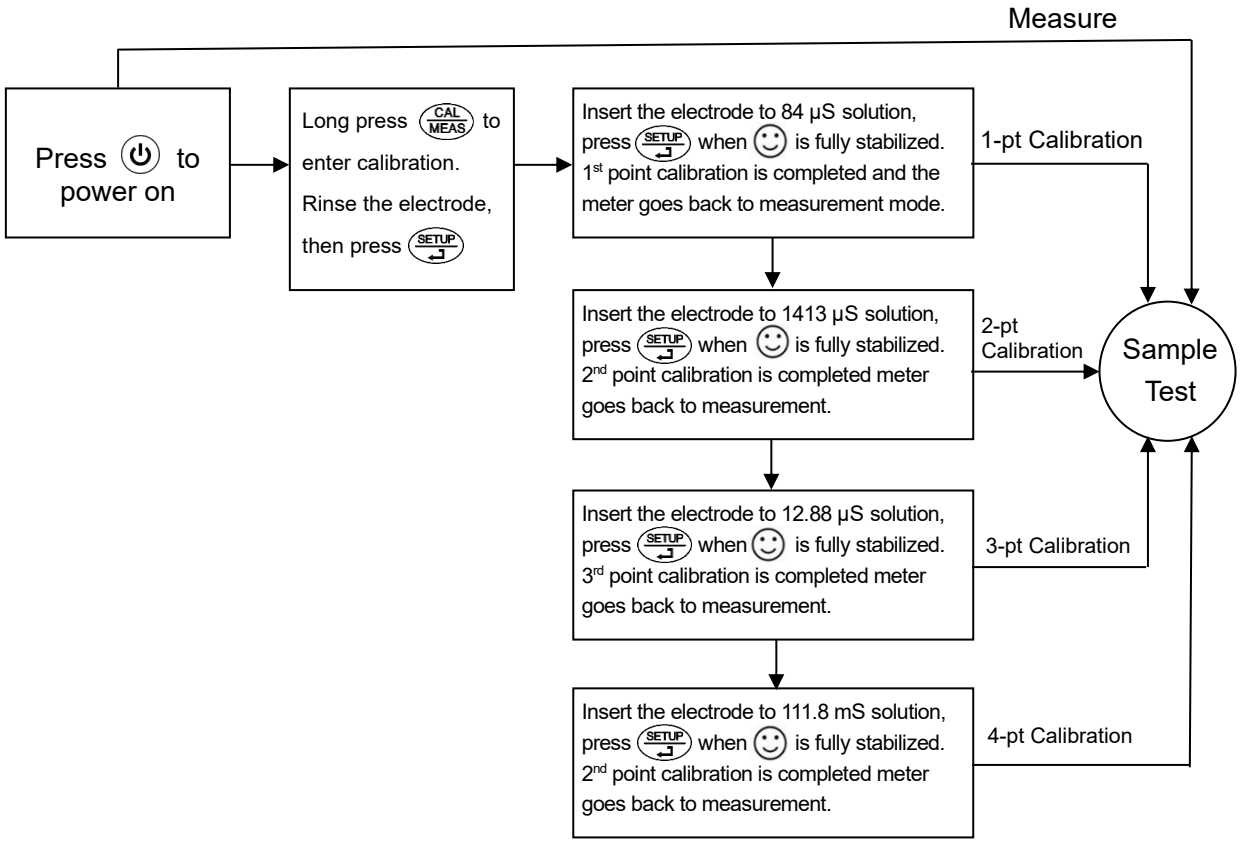


Diagram-20

7.7 TDS and Conductivity

The conversion factor for TDS and conductivity is 0.40 to 1.00, which can be set in parameter setting 2.7, and the meter is factory set to 0.71. Users can adjust the conversion factor of TDS according to the experimental data and experience in parameter setting 2.7. Table-13 lists some commonly used TDS conversion factors according to the solution conductivity, for reference only. TDS doesn't need to be calibrated. Calibrate conductivity and switch to TDS mode.

Table-13 Conductivity and TDS Conversion Factor

Solution's conductivity	TDS conversion factor
0 to 100 µS/cm	0.60
100 to 1000 µS/cm	0.71
1 to 10 mS/cm	0.81
10 to 100 mS/cm	0.94

7.8 Salinity Types

The salinity types are linear salinity, NaCl salinity and saltwater salinity. The linear salinity is calculated according to the measured conductivity value (0.5 conversion factor). The NaCl salinity and saltwater salinity are programmed based on 2 predetermined salt curves. The salinity type can be set in parameter setting 2.8 and the meter is factory set to “linear” salinity. Salinity doesn't need to be calibrated. Calibrate conductivity and switch to salinity mode.

7.9 Back to Factory Default Settings

The meter has the function of restoring factory settings. For details, see parameter setting 2.9 (see Diagram-21). This function will clear all calibration data, return the instrument calibration to the theoretical value and restore some of the function settings to their initial values (see Section 4.4.3 for details). When the instrument calibration or measurement is abnormal, this function can be enabled to restore the instrument to the factory settings before calibration. Restoring the factory settings is irreversible, so please pay special attention when enabling.

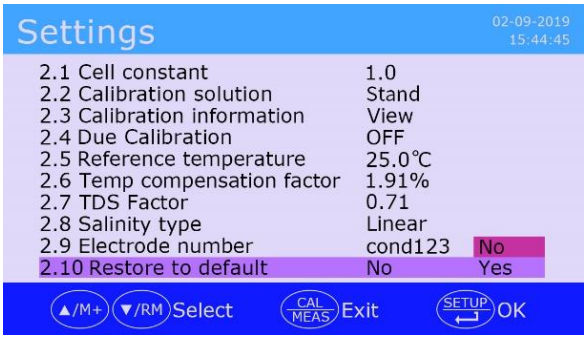


Diagram-21

7.10 Conductivity Electrode Maintenance

a) Conductivity electrodes must be kept clean. Rinse the electrode with distilled or deionized water and dry it before measuring. It is best to rinse the electrode with the solution to be tested. After use, clean it with distilled or deionized water.

b) When calibrating and measuring, stir the electrode in solution to eliminate potential air bubble interference and make the measurement fast and stable;

c) The electrode head (platinum black plating part) is suitable for storage under humid conditions to ensure a faster response. If the electrode is stored dry for a long time, the response may be slow. In this case, immerse the electrode in the calibration solution of 12.88mS for 5 to 10 minutes, or soak in tap water for 1 to 2 hours to restore the electrode to normal.

d) The surface of the sensing layer of the 2401T-F conductivity electrode is plated with platinum black to reduce the polarization of the electrode and expand the measuring range. If the electrode is contaminated, rinse it off with distilled water. For tough organic contaminants, use warm water or alcohol to rinse off. Do not brush the surface of the sensor to prevent damage.

8 Data Processing Modes (Save, Recall, Print, Delete)

8.1 Data Processing Flowchart

The data storage has three modes: “memory”, “printer” and “computer”, as well as “manual” and “auto. timing” data logging modes. Diagram-22 is a flowchart explaining various storage and data logging modes.

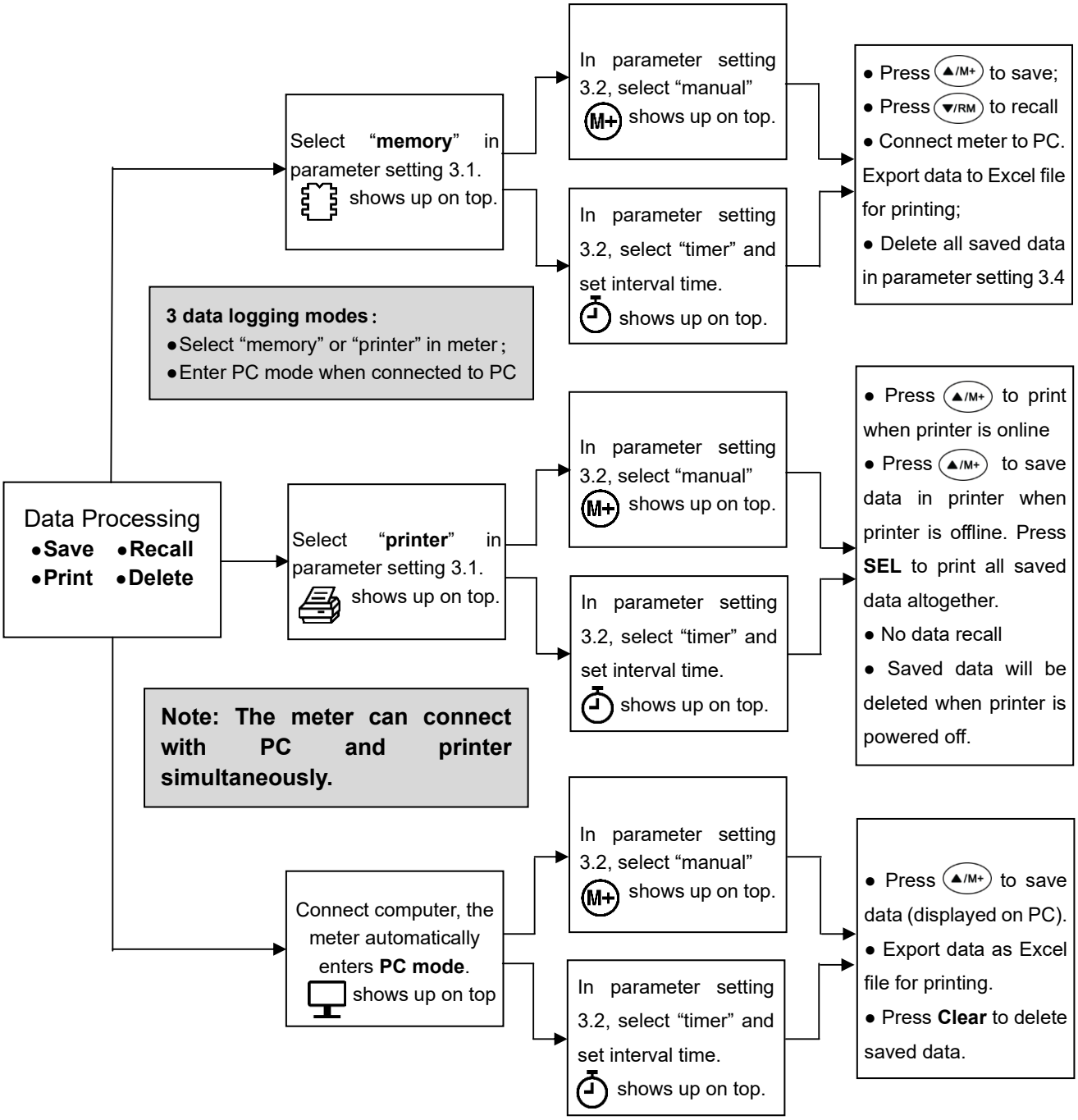


Diagram-22

8.2 Log Data in Meter

8.2.1 Setup

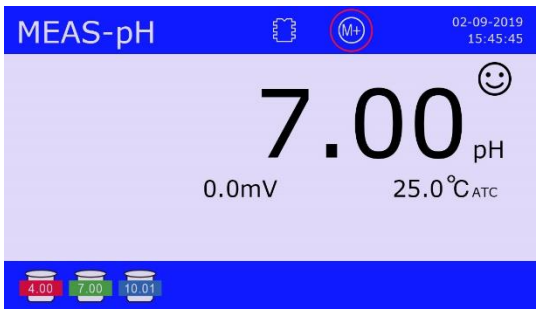
Select Memory in parameter setting 3.1. displays on top of the screen. All data will be stored in the meter.

8.2.2 Data Storage

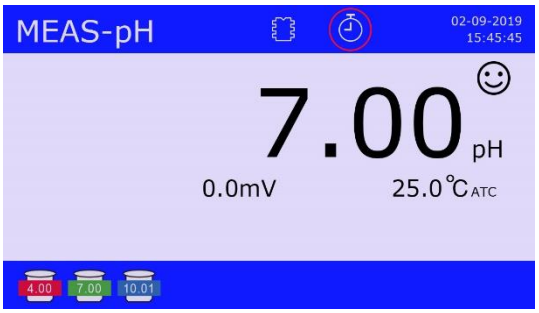
The PH9500 and EC9500 models has a storage capacity of 1000 sets, and the PC9500 can store 2000 sets. Single parameter display mode: 1 serial number corresponds to 1 set of measurement data; double parameter display mode: 1 serial number corresponds to 2 sets of measurement data (pH + conductivity). When the storage is full, if you press ▲/M+, "**FULL**" will flash under the number icon to remind you that the storage is full and you need to delete it first. Saved data can be deleted in parameter setting 3.4.

8.2.3 Data Logging Modes

In parameter setting 3.2, you can select "manual" or "auto. timing" data logging mode. When manual is selected, M+ will be displayed on top of the display; when auto. timing is selected, will be displayed on top of the display, as shown in Diagram -23.



(a) Manual data logging mode



(b) Auto. timing data logging mode

Diagram-23

8.2.4 Save, Recall, Delete

(a) Manual data logger

Set "Manual" in parameter setting 3.2, press ▲/M+ during storage, the display screen is as shown in Diagram-24. 8 indicates that the 8th group of data has been stored, press ▼/RM to display the stored data page, as shown in Diagram- 25. If there are more than 8 sets of stored data, press ▲/M+ or ▼/RM to turn the page.

Diagram-24

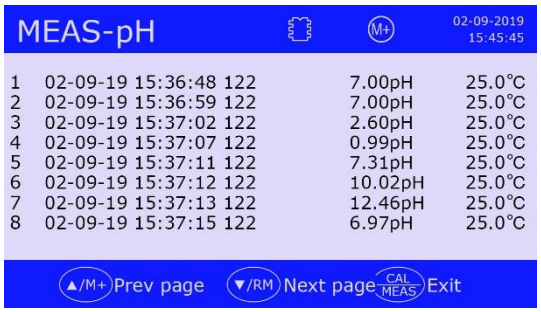


Diagram-25

(b) Auto. timing data log

Select “Timer” in parameter setting 3.2 and set the data logging interval time (by every X seconds or minutes), for example, 10 seconds, press (▲/M+) to start auto. data logger, flashes, the first set of measurement data is stored and shows up, then every 10 seconds one set of data will be stored and the storage number will be automatically increased. Press (▲/M+) again to stop auto. data logger. press (▼/RM) to display the stored data page, and then press (▲/M+) or (▼/RM) to turn the page.

(c) Print

The data stored in the meter cannot be directly printed. The stored data needs to be uploaded to the computer via USB cable and then exported to an Excel document for printing. See section 8.4 for details.

(d) Delete

If the storage is full, delete it by selecting Yes in parameter 3.4. Otherwise, data logging can’t be continued.

8.3 Print Data

The meter is only compatible with Apera’s TH192G Pin-Type Mini Printer, which is sold separately.

8.3.1 Setup

Select "Printer" in parameter setting 3.1, and icon will show up on top of the display, indicating that the data will be stored in the printer, and the real-time printing is completed by TH192G Pin-Type Mini Printer. The data is stored in the printer and there are no data storage icons on the display and no data recalling.

8.3.2 Install Printer

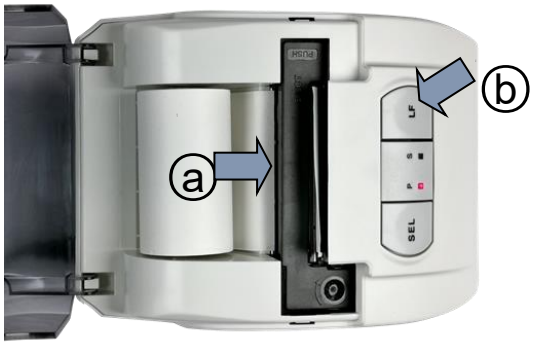
Connect the printer and the meter via the data cable first, then turn on the printer. The power switch is at the bottom left of the printer. The buttons and indicators are as follows:

P (red light) — Power indicator, red light means power is on.

S (green light) — Green light on means the meter is in online status; Green light off means the meter is in offline status.

SEL button — Press the button to switch between online (green light) and offline (green light off).

LF button — When the printer is offline, press the button to transfer printing paper. For printing paper installation, refer to Diagram-26; printer ribbon replacement, refer to Diagram-27.



ⓐ Insert printing paper here

ⓑ Press **LF** button when offline to transport paper

Diagram-26

ⓒ Press here to remove printer ribbon.

Diagram-27

8.3.3 Printer Information

(a) Complete format

Selecting “Complete” in parameter setting 3.3 to use the complete printing format. The printing information includes device information, calibration information, and measurement data. The device information refers to the instrument model number, serial number, electrode ID, company name, and operator ID; the calibration information refers to the last calibration record; the measurement data refers to the numberings, date, time, sample ID, measured value, and temperature.

Note: When selecting the complete format, each print contains a prefix for the device and calibration information.

(b) Simple format

In the parameter setting 3.3, select “simple” to use the simple printing format. The first print after the meter is turned on will include the device information and the calibration information. Afterwards, it will only print out data information, including numberings, date, time, sample ID, measured value, and temperature. If users require the device and calibration information again, just reboot the meter.

(c) ID Setup

To set the ID, insert the keyboard into the “Keypad” socket of the instrument, use the keyboard to input up to 8 digits of English letters and numbers. The settings include sample ID, operator ID, company name, pH electrode ID, and conductivity electrode ID. Calibration passwords can also be set (refer to Section 4.4 “Parameter Settings” for details).

8.3.4 Data logging and printing

(a) Manual Data Logger Printing

In parameter setting 3.2, select “manual”, M+ will be displayed on top of screen. Set the printer to online mode (green light on), short press ▲/M+ to print out the measurements; if the printer is in offline mode (green light is off), press ▲/M+ to store the data in printer temporarily. According to your needs, after storing enough data, press SEL button of the printer to print out the previously stored data altogether.

(b) Auto. Timing Printing

In parameter setting 3.1, select “Timer” and set the storage interval time (such as 3 minutes). ⏱ will be displayed on top of screen. Set the printer to online mode (green light on), press ▲/M+ to print out the measurements, and it will automatically print again by every 3 minutes; If the printer is in offline mode (green light off), pressing ▲/M+ to store the data in printer temporarily by every 3 minutes. Then press **SEL** button of the printer to print out the previous stored data altogether.

8.3.5 Delete Data

In offline mode (green light off), the stored value will be deleted when the printer is turned off.

8.4 Data logging via PC

8.4.1 Install Software

a) This instrument uses the PC-Link 9500 communication software, and the communication port is USB. Copy the PC-Link 9500 program files to the computer from the flash drive, connect the USB communication cable to the PC socket of the meter and the computer's USB port. The software will be automatically open. The instrument and the computer will be automatically connected, and  will show up on top of the display.

b) If manual data logger is selected, press ▲/M+ data will be uploaded to the computer; if auto. timing data logger is selected, press ▲/M+, data will be uploaded to the computer by the certain timing you set. All the data uploaded to the computer will not be saved in the meter. Auto-timing data logger will generate a measurement curve in PC-Link software as shown in Diagram-28.

c) If the printer is connected at the same time, it can also print out the data while uploading them to the computer.

8.4.2 Software Interface

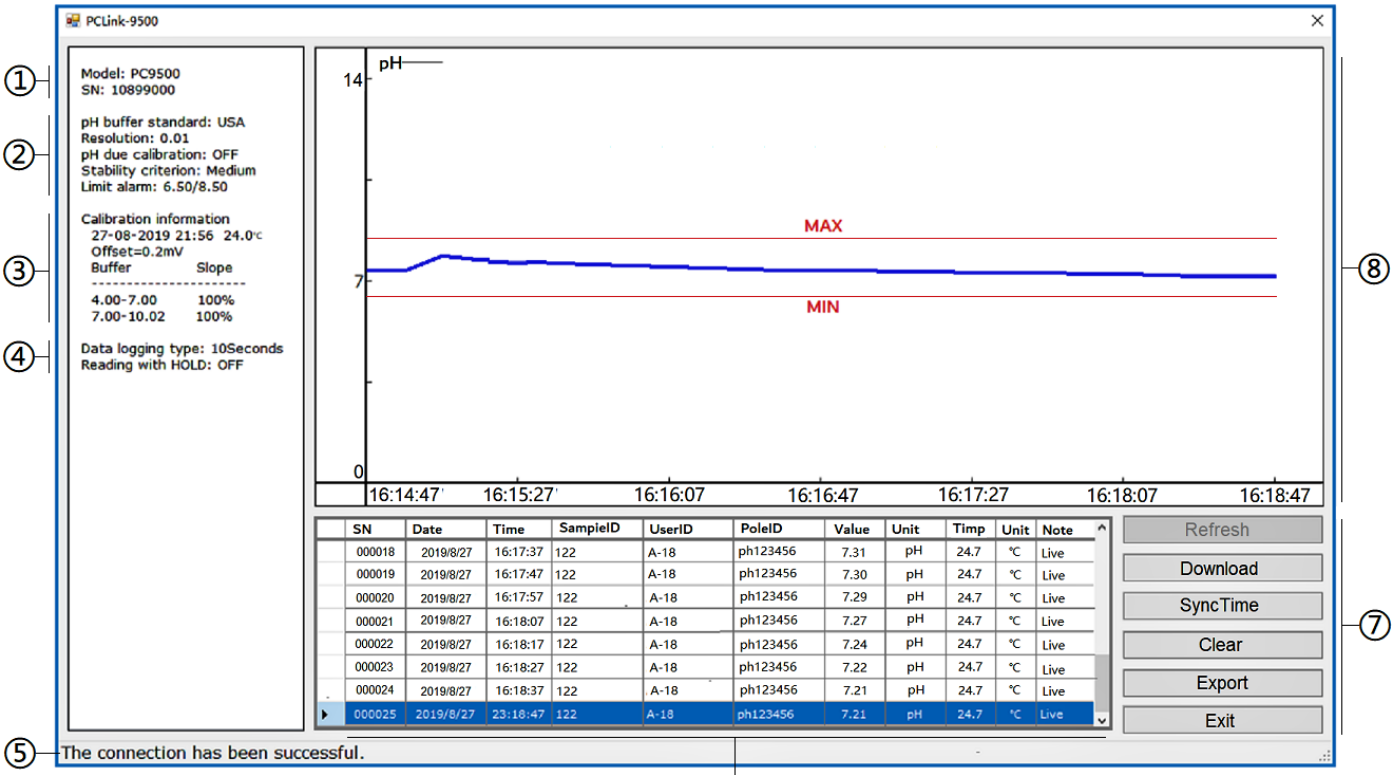


Diagram-28

Note: In the pH measurement alarm mode, the curve area shows the maximum and minimum red lines.

①	Model number and Serial number	⑤	Prompt for PC connection
②	Parameter setting information	⑥	Data area
③	Calibration information	⑦	Operation keys
④	Data logging type	⑧	Measurement curve area

8.4.3 Operation Keys of PC-Link

Refresh — When the meter and the computer are not connected, press the button to connect again.

Download — Upload the data in the meter's memory to the computer.

SyncTime — Sync the time and date of PC to the meter.

Clear — Clear the data.

Export — Export the stored data to a Microsoft Excel document for further analysis.

Exit — press to exit PC-Link.

9 What's in the Kit

	Content	Quantity	PH9500	EC9500	PC9500
1	PH9500 pH Meter	1	√		
2.	EC9500 Conductivity Meter	1		√	
3.	PC9500 pH/Conductivity Meter	1			√
4.	606 Test-Bench (including a flexible electrode holder)	1	√	√	√
5.	LabSen 211 glass pH combination electrode	1	√		√
6.	MP500 temperature electrode	1	√		√
7.	2401T-F conductivity electrode（ATC, K=1.0）	1		√	√
8.	pH standard pH buffers (4.00/7.00/10.01pH/50mL each)	1 for each	√		√
9.	Conductivity standard calibration solutions (84μS/1413μS/12.88mS/50mL each)	1 for each		√	√
10.	Stirrer cable	1	√	√	√
11.	USB cable	1	√	√	√
12.	PC-Link 9500 flash drive	1	√	√	√
13.	Keyboard	1	√	√	√
14.	9V Adapter	1	√	√	√
15.	Vials	/	3	3	6
16.	L200 stir beads	/	3	3	6
17.	User Manual	1	√	√	√

10 Other Parts and Accessories

	Models	Name	Information
1.	TH192G	Pin-type mini printer	Printer×1, power adapter×1, data cable×1, printer ribbon×2, printing paper×2
2	TH5740	Printing paper	14 rolls per box
3	CRC-09	Printer ribbon	5 pieces per box
4	LabSen213	3-in-1 pH Electrode	For general water solutions. Built-in temp. sensor, ATC available.
5	LabSen231	Glass pH Electrode	For wastewater, emulsions, and suspensions
6	LabSen221	Glass pH Electrode	For low-ion concentration samples and viscous samples
7	LabSen371	Flat pH Electrode	For surface pH measurement like skin, fabrics, paper, leather, etc.
8	LabSen241-6	Semi-micro pH Electrode	Electrode width: Φ6×100mm, suitable for test tubes and small volume measurement (<0.2mL)
9	LabSen241-3	Micro pH Electrode	Electrode width: Φ3×70mm，suitable for micro-volume measurement (<20μL)
10	LabSen251	Glass Spear pH Electrode	For soft-solid samples
11	LabSen801	Pure water pH Electrode	For pure water e.g. drinking water, distilled water, RO water, etc.
10.	LabSen811	Ultra-pure water pH Electrode	For ultra-pure water
12	LabSen721	Food pH Electrode	For soft-solid food samples e.g. cheese, meat products, fruits, sushi rice, etc.
13	LabSen761-B	Blade Spear pH Electrode	For meat and fish
14	LabSen831	HF pH Electrode	For strong acid solutions and solutions containing hydrofluoric acid
15	LabSen841	Strong alkaline pH Electrode	For strong alkaline solutions and high-temp solutions
16	LabSen851-3	Viscous sample pH Electrode	For highly viscous samples e.g. cosmetics, paints, resin, etc.
17	LabSen881	Low-temp pH Electrode	For low-temp solutions
18	DJS-0.1-F	Conductivity Electrode	k=0.1, built-in temp. sensor, comes with a flow cell, for pure water conductivity tests
19	2310T-F	Conductivity Electrode	k=10, built-in temp. sensor, for saltwater and seawater conductivity tests
20	3501Pt-C	Glass ORP Electrode	Glass body, Φ6×2.5mm platinum ring, for ORP measurement

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, LLC, any malfunctioned or damaged product attributable to responsibility of APERA INSTRUMENTS, LLC for a period of THREE YEARS (SIX MONTHS for the electrodes) 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.

To submit a warranty request, go to support.aperainst.com and click “New Support Ticket” on the upper right corner. Fill out the form, then click Submit. One of our customer support specialists will help you fulfill the warranty in one business day.

APERA INSTRUMENTS, LLC
Address: 6656 Busch Blvd, Columbus, Ohio 43229
Tel: 1-614-285-3080
Email: info@aperainst.com
Website: aperainst.com