MP511 pH/mV Benchtop Meter

Instruction Manual

RoHS compliant CE ISO 9001:2008 IP54 WATERPROOF

APERA INSTRUMENTS, LLC

www.aperainst.com

v4.1

Contents

1 Brief Introduction

Thanks for purchasing APERA INSTRUMENTS MP511 pH/mV Benchtop Meter (referred to “meter” as below). Before using this meter, please read this instruction manual cafrefully in order to properly use and maintain it.

Features

This meter has an outstanding combination of advanced electronic technology, sensor technology and software design. It is suitable for laboratory use to measure pH and ORP value of regular water solutions. With its built-in microprocessor chip, elegant designs and user-friendliness, this meter has the following features:

- Meets international GLP standards, with intelligent functions such as automatic calibration, automatic temperature compensation, data storage, auto. timing measurement, RS232 output, clock display, parameter setting and self-diagnosis.
- With digital processing technology, the response speed and accuracy are greatly improved, ☺ appears when readings are stable.
- Automatic pH buffer solution recognition. Buffer solution selectable: USA series, NIST series and China series.
- The meter meets IP54 protection level. All of the sockets are protected by the silica gel caps.

2 Technical Specifications

2.1 Technical Parameters

pH	Range	(-2.00 – 19.99) pH
	Resolution	0.1/0.01 pH
	Accuracy	±0.01pH±1 digit
	Input Current	≤2×10^{-12} A
	Input Impedance	≥1×10^{12} Ω
	Stability	±0.01 pH±1 digit/3h
	Temp. Compensation Range	(0 – 100)˚C (Automatic or Manual)
mV (ORP)	Range	-1999mV – 0 – 1999mV
	Resolution	1mV
	Accuracy	±0.1% FS
Temp.	Range	-10˚C – 110˚C
	Resolution	0.1˚C
	Accuracy	5 – 60˚C : ±0.5˚C±1 digit Other : ±1˚C

2.2 Other Technical Parameters

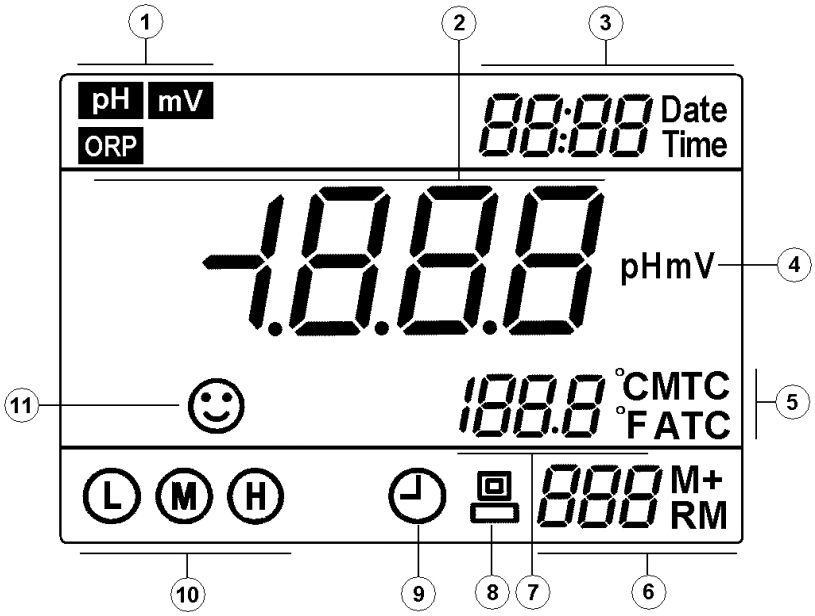
Data storage	600 groups
Storage content	serial number, date, time, measurement value, temperature value, ATC or MTC state
Communication connector	RS232
Power	DC9V/0.5A
IP rated	IP 54 dustproof and splash-proof
Size and weight	160 × 190 × 70mm/880g
Quality and safety certification	ISO9001:2008 and CE

3 Complete Kit

3.1. MP511 pH/mV/Temp Meter	1 unit
3.2. 602 flexible electrode holder	1 pc
3.3. 201T-F pH/ATC three-in-one combination electrode	1 pc
3.4. pH standard buffer solution(pH 4.00, 7.00, 10.01/50ml)	1 set
3.5. 9V power adapter	1 pc
3.6. RS232 data communication cable	1 pc
3.7. MP500 PC-Link software CD	1 pc
3.8. Operation manual	1 pc
3.9. Quick manual	1 pc

4 The Meter

4.1 LCD Display



① — Measurement mode icon

② — Measurement value

③ — Time and date

④ — Units of measurement

⑤ — Temperature compensation icon:

ATC — automatic temperature compensation;

MTC — manual temperature compensation

⑥ — Serial number and icon of data storage and recall

M+ — icon for measurement storage;

RM — icon for reading recalls; Numbers on the left is serial number.

⑦ — emperature measurement and unit

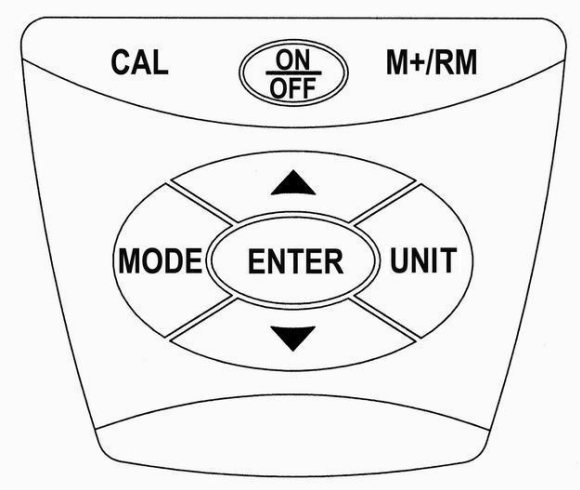
⑧ — RS232 communication icon When this icon appears, the meter has been connected to a computer or laptop.

⑨ — Timing measuring icon

⑩ — Electrode calibration indication icon

⑪ — Stability icon of readings

4.2 Keypad



Keypad operations: Short press— <1.5 seconds; Long press — >2seconds.

Keypad operations and descriptions

Keypad	Operations	Descriptions
ON / OFF	Short press	● Turn on/off the power. **Attention**: Only under measuring mode can the meter be turned off. If under calibration or parameter setting mode, the operation will be invalid. You need to press **<ENTER>** and go back to measuring mode. Then press **<** **N / OFF** **>** to turn off.

CAL	Short press	● The meter will go to calibration mode. Short pressing again starts calibration.
MODE	Short press	● To select the parameters: **pH** → **mV**
	Long Press	● Enter into parameter setting mode P1. Once in this mode, short press to enter P2, P3,P4 and so on.
UNIT	Short press	●In pH measuring mode: press the button to change the resolution repeatedly: 0.01→0.1pH ● In mV measuring mode：press the button to change parameter mode: **mV** →**ORP** ● In parameter setting mode: press the button to move the number position.
ENTER	Short press	● In calibration mode: press the button to confirm 1-point or 2-point calibration and then return to measuring mode. ● In parameter setting mode: press the button to confirm parameter setting and then return to measuring mode. ● In (RM) mode: press button to return to measuring mode.
▲ ▼	Short press Long press	● In MTC mode: press the button to increase or decrease the temperature. The temperature will be altered quickly with long press. ● In parameter setting mode: press the button to changer numbers or ON/OFF state. ● In (RM) mode: press the button to alter the storage serial number. Long press to alter quickly.
M+/RM	Short press Long Press	● Short press to store measurements; long press to recall measurements.

4.3 Store, recall and clear readings

4.3.1 Store

(a) In measuring mode, once the measuring value is stable and the ☺ appears, Short press **< M+/RM >** key, LCD will display **"**M+**"** icon and storage serial number. These measurements will be stored in memory. The meter can store up to 600 groups of measurement values; 300 groups in each of the pH and mV measuring modes.

(b) In timing measuring mode, ◴ icon will appear on the LCD screen. The meter will continuously conduct measurements according to the set parameter (eg. Every 7 sec) and stores the data simultaneously.

4.3.2 Recall measuring information:

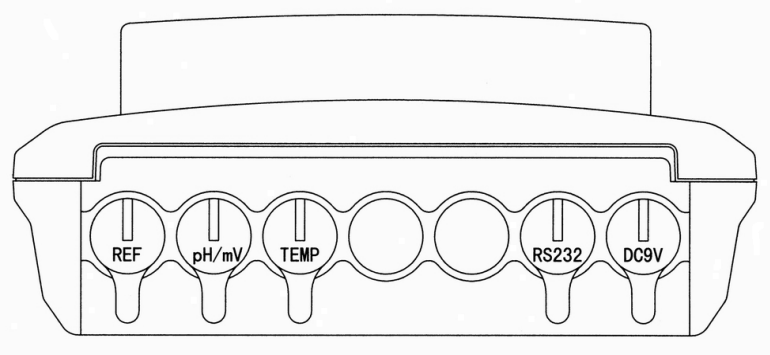
(a) In measurement mode, long press **< M+/RM >** key, the meter will recall the previous stored information. The storage serial number, **RM** icon and the complete measuring information will appear on the lower right corner of the LCD screen; measuring time and date will be displayed on the upper right corner. Then press **< ▼ >** or **< ▲ >** key and the measured information will be recalled accordingly. Long press **< ▼ >** or **< ▲ >** key to rapidly check the measuring information under other serial number.

(b) In the recalling mode, press **< ENTER >** key to return to the measuring mode.

4.3.3 Clear stored value

In the recalling mode, long press **< M+RM >** key for 5s, CLr icon will appear on the LCD for 2s. It means the internal storage has been cleared.

4.4 Sockets:



REF — Reference electrode socket

pH/mV — pH and ORP electrode socket (BNC socket)

TEMP — Temperature electrode socket (RCA socket)

RS232 — RS232 communication connector socket

DC9V — DC9V power socket, Φ2.5, inner **"+"** outer **"-"**

5 pH Measurement

5.1 Preparation:

5.1.1 Install the electrode holder

The electrode holder is composed of a metal stand base, and a flexible electrode arm and holder. Simply insert the arm and holder into the metal stand base. Adjust the flexible arm and holder according to your needs.

5.1.2 Connect the power adapter

Plug the power adapter tightly into the DC9V socket. The power's voltage should meet the requirements listed on the power adapter.

5.1.3 Things needed in addition to what's included in the box

A clean cup, distilled water (8-16oz), and tissue papers for rinsing and drying the probe.

5.2 pH Electrode Information

5.2.1 pH Electrode

The meter comes with the 201T-F 3-in-1 combination electrode with a built-in temperature sensor, which enables the automatic temperature compensation. This electrode is only suitable for regular water solutions' pH testing. Please refer to Section 9 for ideal pH electrodes to use for other specific applications. The electrode's housing adopts polycarbonate materials, which is resistant to shocks and corrosion. A 3M KCL storage bottle comes with the electrode, which is for storing the electrode when not in use to keep the sensitivity of the probe.

5.2.2 Technical Specifications of the 201T-F pH Electrode

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

5.2.3 Electrode Connectors

The pH electrode has two connectors: the BNC connector connects the pH probe; the RCA connector connects the temperature sensor. Plug these two connectors into 'pH/mV" and "TEMP" sockets. Please note not to pull the cables in case of poor contact. Please keep the connectors clean and dry. Refer to section 4.7 regarding how to properly maintain the pH electrode.

5.2.4 Use the Electrode

Screw off the KCL storage bottle, and put it aside (do not dump or spill the KCL solution). Prepare a cup of distilled water, and rinse the electrode in it for a few seconds. Gently shake the probe to remove excess water, and dry it with clean tissue paper (DO NOT rub or wipe the probe, just use paper to dap off excess water). Gently stir the electrode for a few

seconds after it's dipped into the test solution and then let it stand still. Wait for the stable measurement (a smiley face appears and stays) and then record the readings. When test is finished, place the electrode in the storage bottle and tighten the cap in order to keep the sensitivity of the pH sensor.

5.3 Calibration:

5.3.1. Switch in power, press **< ON/OFFO >** key to turn on.

5.3.2. Short press **< MODE >** key to switch to **pH** mode.

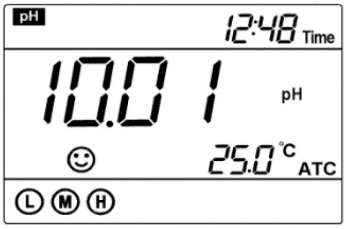
5.3.3. Insert the pH electrode (remove the storage cap) into the meter's socket.

5.3.4. Press **< CAL >** to enter calibration mode, LCD flashes CAL 1 indicating to make the 1st point calibration.

5.3.5. Rinse pH electrode in distilled 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 reading is stable and ☺ icon appears and stays, then press **< CAL >**, LCD flashes 7.00 pH, calibration finishes after several seconds and then CAL2 flashes, indicating the 1st point calibration has been finished and the 2nd point calibration begins.

5.3.6. Take out the pH electrode, rinse it in distilled 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 reading is stable and ☺ icon appears and stays, then press **< CAL >**, LCD flashes 4.00pH, calibration finishes after several seconds and then CAL3 flashes, indicating the 2nd point calibration has been finished and the 3rd point calibration begins.

5.3.7. Take out the pH electrode, rinse it in distilled water, allow it to dry and submerge it in pH 10.01 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until reading is stable and ☺ icon appears and stays, then press **< CAL >**, LCD flashes 10.01pH,calibration finishes while displaying a stable pH and temperature value. (L) (M) (H) icon appears on the screen,indicating 3 points calibration has been finished. See picture (4-1).



Picture (4-1)

5.3.8. Notes

(a) The meter can perform 1 point, 2 points and 3 points of automatic calibration. When the 1st point calibration finished, press **< ENTER >** key to confirm and enter measuring mode. (M)

icon for one-point calibration will appear on the lower left corner of the LCD. When the measuring accuracy is ≤±0.1pH, choose one kind of buffer solution according to the measuring range and then proceed with one-point calibration.

(b) When the 2nd calibration finishes, press **< ENTER >** key to confirm 2 points calibration and enter into measuring mode. Icons (L) or (H) for 2 points calibration will appear on the lower left corner of the LCD. If measurement is within acid range, you can choose pH4.00 and pH7.00 for calibration. If the measurement is within alkalinity range, you can choose pH7.00 and pH10.01 for calibration.

(c) How often to calibrate

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

a) The electrode hasn't been used for a long time or a new electrode is connected.
b) After measuring strong acid (pH<2) or strong base (pH>12) solutions.
c) After measuring fluoride-containing solution and strong organic solution
d) There is a significant difference between the temperature of the test sample and the temperature of the buffer solution that is used in the last calibration.

5.4 Sample Test

Rinse pH electrode in distilled water, allow it to dry, and submerge it in sample solution. Stir the solutionbriefly and allow it to stay in the sample solution until the stable value and ☺ icon appears and stays on LCD, get the reading which is pH value of sample solution. Please note that the closer the temperature of the sample solution to the calibration solution's is, the more accurate readings will become.

5.4.1 Notes

*1) This default 201T-F electrode **will NOT** give accurate and stable pH readings when testing purified water such as **distilled or deionized water**. This because those water do not have enough ions present for the electrode to function properly. To measure distilled or deionized water's pH, users need to use a specialized pH electrode with the meter such as LabSen™ 803 Pure Water pH Electrode. Contact us at 1-614-285-3080 for more details.*

2) *When testing purified water like spring water or drinking water, it will take longer for the readings to get stabilized (typically 3-5 minutes) because there is very few ions left to be detected by the sensor in those purified water.*

3) *Purified water such as distilled water and deionized water are recommended for **only rinsing** the probe for the best result. **Never** store the electrode in distilled or deionized water, for it could cause permanent damage to the electrode.*

4) *The 201T-F pH Electrode is **NOT** suitable for testing high-temperature samples (>176˚F). Testing high-temperature samples could cause permanent damage to the electrode. A specialized electrode such as LabSen™ 213 (up to 225˚F) should be used in this situation.*

5) *The electrode housing is polycarbonate. When using cleaning solutions, take cautions on carbon tetrachloride, trichlorethylene, tetrahydrofuran, acetone, etc., which will dissolve the housing and invalidate the electrode.*

5.5 Parameter Setting

5.5.1 pH measuring parameter setting

Chart (4-1)

Mode	Parameter Settings	Code	Parameters
P1	pH buffer solution series selection	SOL	USA (Europe & U.S.A series) NIS (NIST series) CH (China series)
P2	Time setting for timing measuring		0-99 min
P3	Unit of temperature		˚C - ˚F
P4	Date setting	Date	Month / Day / Year
P5	Time setting	Time	Hour / Minute
P6	Restore factory setting		OFF - On

5.5.2. Select pH buffer solution standard (P1) with

(a) Long press **< MODE >** key to enter into P1 mode, see picture (4-2).

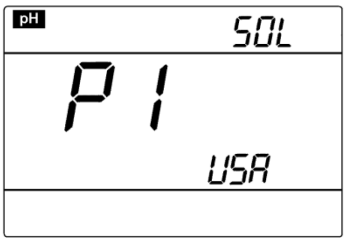
(b) Press **<▲>** or **<▼>** key to choose buffer solution series:

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

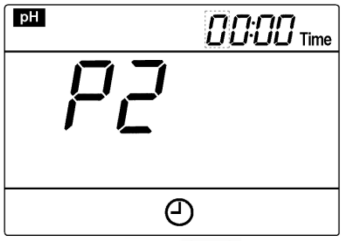
nIS (NIST series) — 1.68, 4.01, 6.86, 9.18 and 12.45 pH

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

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



Picture (4-2)



Picture (4-3)

5.5.3. Time setting for timing measurement (P2)

(a) Short press **<MODE>** key in mode P2 to enter into mode P3. See picture (4-3)

(b) Press **< UNIT >** key, the " 0 " will move to the right and flash. Press **<▲>** or **<▼>** key to change when the number is flashing.

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

(d) Factory setting is **0** second.

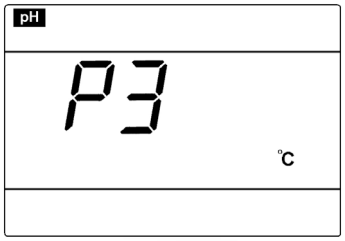
Note：in the form of " 00:00 ", on the left side of " : " is minute, and its maximum setting is 99; on the right side of " : " is second, its maximum setting is 59. After set timing measuring mode, icon will appear on the LCD screen.

5.5.4. Temperature unit ˚C/˚F setting (P3)

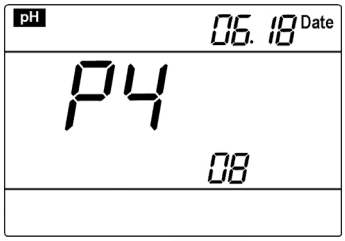
(a) Short press **<MODE>** key in mode P2 to enter into mode P3, see picture (4-4)

(b) Press **<▲>** or **<▼>** key to choose temperature unit: ˚C or ˚F.

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



Picture (4-4)



Picture (4-5)

5.5.5. Date setting (P4)

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

(b) Press **< UNIT >** key, the number will move rightward and flash，press **< ▲ >** or **<▼>** key to alter the number. The upper right is month-day and the lower right is year.

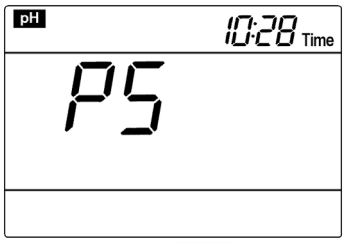
(c) Press **< MODE >** key to enter into next parameter setting or press **< ENTER >** key to conform and return to measuring mode.

5.5.6. Time setting (P5)

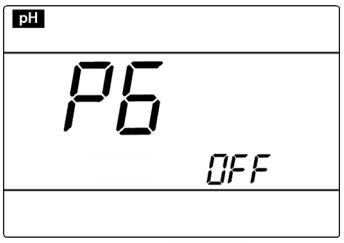
(a) Short press **<MODE>** key in mode P4 to enter into mode P5, see picture (4-6)

(b) Press **< UNIT >** key, the number will move rightward and flash，press **< ▲ >** or **< ▼ >** key to alter the number.

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



Picture（4-6）



Picture（4-7）

5.5.7. Restore to factory setting (P6)

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

(b) Press **<▲>** key to choose **“** On **”**, indicating parameter setting has been restored to the factory setting state. It will then return to measuring mode after 2s.

5.6 Notes

1) After immerging the pH combination electrode into the solution, please stir the solution briefly in order to remove air bubbles and obtain a faster response and stable measurement value.

2) If a temperature electrode is not present, users can press **< ▲ >** or **< ▼ >** key to perform manual temperature compensation.

3) There is a protection bottle surrounding the tip of the pH electrode. This contains the KCL soaking solution. The tip of the electrode should be immerged in the solution to keep the glass bulb junction’s activation. Unscrew the cap, pull out the electrode and rinse it in distilled water before measuring. Once done testing, put in the electrode in the soaking bottle and screw the cap tightly to prevent solution leakage. If the soaking solution is turbid or moldy, please replace the solution and clean the probe immediately.

4) Users should prevent the electrode from being soaked into distilled water, protein solution and acid fluoride solution and from contacting with organic solutions.

5) In order to improve the accuracy, the pH value of the buffer solution should be known

and reliable. Buffer solution should be changed after 10-15 times of calibrating.

6) Keep the meter clean and dry; especially the electrode and the socket of the electrode. Failure to do so may lead to an inaccurate measurement or invalidity. Clean stains with medical cotton and absolute alcohol and blow-dry afterwards.

7) The sensitive glass bulb in front of the combination electrode should not come in contact with hard surfaces (they might get broken). Scratches or cracks on the electrode will cause inaccurate readings. Before and after each measurement, rinse the electrode with distilled water and then throw off excess water on the electrode. Do not rub the glass bulb with a tissue for it will affect the stability of the electrode potential and increase the response time. The electrode should be thoroughly cleaned if there are residuals on the electrode. Use soap water and a soft brush if necessary.

8) The life span of pH electrode is about 1-2 years. This will be shortened if used in extreme condition or improperly maintained. The aged and invalid electrode should be replaced in time.

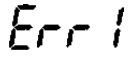
9) If the calibration or display of the meter occurs abnormal, please set P6 to be “On” to restore to factory setting and perform calibration again.

10) Please don’t disconnect the power plug until the meter is turned off. Disconnecting power when meter is still on will cause damage to the meter.

5.7 Self-diagnostic Information

In the process of using, some icons might appear. This is the self-diagnosis for the meter, which will help to understand the problems of the meter or electrode during usage:

5.7.1. The stationary“**- 2.00 pH**” or **“ 19.99 pH ”** icon — this means the measurements has exceeded the measuring range. If the meter is not properly connected with the electrode or the electrode is not immerged into the solution, such icons will also appear.

5.7.2.  — Electrode zero potential is exceeded (<-60mV or >60mV)

5.7.3.  — Electrode slope is exceeded (< 85% or >105%)

5.7.4. When or appears on the upper right corner, the meter will not work normally, please check as following:

(a) Check the electrode bulb and see if there are any air bubbles. If any are present, shake the electrode with your wrist unitl the bubbles have been removed. Be sure to have a firm grip when doing so.

(b) Check the pH buffer solution and see if it goes bad or has bigger error.

(c) Restore the meter to factory setting mode, then recalibrate it. If the sensor doesn’t work after the above checks, please replace the pH electrode.

6 mV and ORP Measurement

6.1 Sample Test

6.1.1. Press **< ON/OFF >** to turn on the meter, press **< MODE >** to switch to **mV** , then press **< UNIT >** key to choose **mV** or **ORP** ;

(a) **mV** — This is the electrode potential measuring mode. mV value and the temperature will be displayed at the same time;

(b **ORP** — This is the ORP (redox) measurement mode. ORP measurement has no temperature compensation, so there is no temperature appears in this mode;

Note: ORP is the abbreviation of “Oxidation-Reduction Potential”, representing the Oxidation-Reduction Potential of the solution, ORP is the measuring parameter for the oxidation reduction potential of the aqueous solution. Use mV as its unit.

6.1.2. Connect ORP electrode (sold separately) or ion electrode, immerge it into the sample solution, stir briefly and then set it still. When smiling ☺ icon appears and stays, the reading is the ORP value or the potential value of the ion electrode.

6.2 Notes

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

6.2.2. Clean and activate ORP electrode: After the electrode has been used over a 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 electrode:

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

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

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

6.3 Parameter Setting

6.3.1. mV and ORP measurement parameter setting (chart (5-1))

Chart(5-1)

Mode	Contents	Code	Parameters
P1	Time set for timing measuring		0 to 99min
P2	Restore to factory setting		OFF-On

6.3.2. Time set for timing measuring (P1): Please refer to 6.5.6.

6.3.3. Restore to factory setting (P2): Please refer to 6.5.7

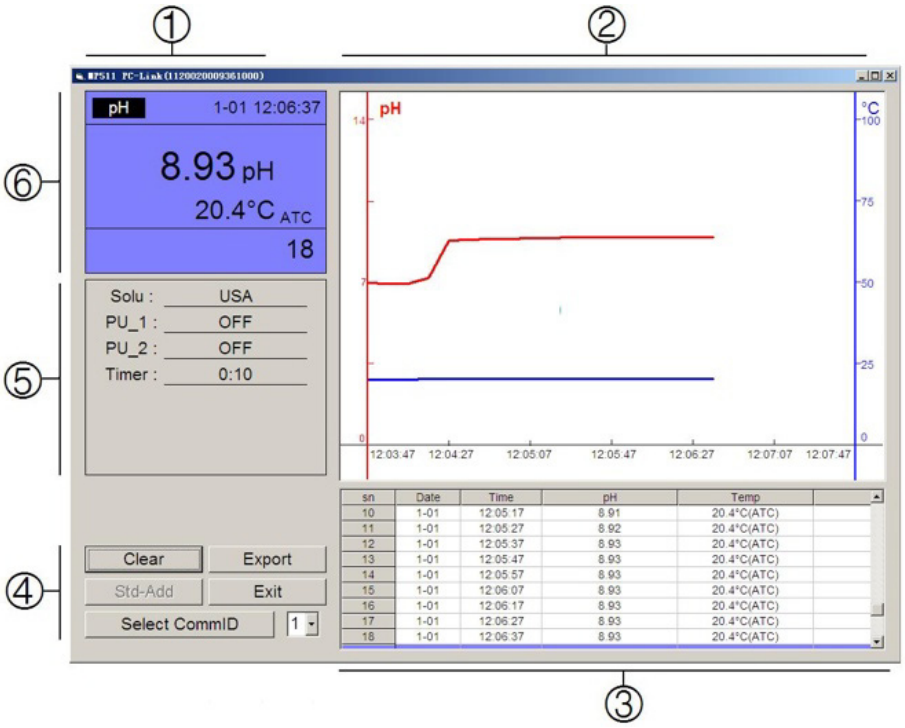
7 RS232 Communication

7.1 System requirements

This meter uses “MP500 PC-Link” communication software for RS232 communication. This software requires the computer to meet such requirement: Personal computer (Microsoft Excel 2000 or the version of higher rank) which can operate Windows-based operation system, PC–IBM compatible with XT and CD-ROM driver, RS232 communication port.

7.2 Software interface

Software interface: refer to Picture (6-1).



Picture (6-1)

① — Meter Serial number

② — Measurements and time curve

③ — Stored value display area

④ — Keys

Clear — Press the key to clear data

Export — Press this key to export the stored value to Microsoft Excel file

Exit — Press this key, PC-Link program exits from the computer interface

Select CommID — Press the key to download the data from the meter and upload it to PC

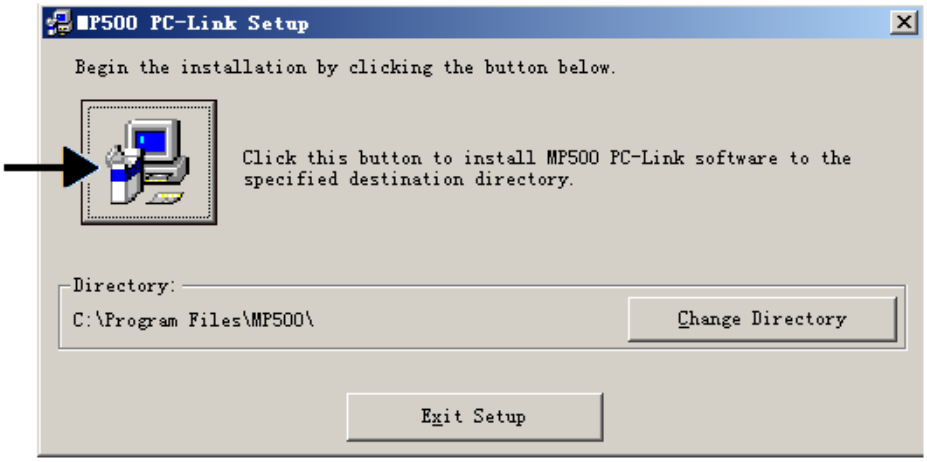
⑤ — Parameters setting：Standard of the buffer solution, time setting etc.

⑥ — Measurements display screen

7.3 Load software

Put the software disk into the computer and install the software as per the following procedures:

Open “PC-Link” file → Double click “Setup” program → Click “OK”→Click the icon (refer to Picture (6-2)) → Click “Continue” → Click “Enter”.



Picture(6-2)

7.4 Port Connection

Connect the meter and PC with RS232 cable and open the MP 500 PC Link Program, the PC will enter into program interface and then click” Select CommID”. The defa ort of the PC is port#1, Icon will appear on the lower left corner of the LCD screen.

NOTE: If computer does not have a RS232 port for connecting, the use can connect to the computer via USB using a RS232 / USB converter (Apera Instruments does not provide).

7.5 Run Software

7.5.1. Upload the stored value

When the meter is connected with PC and icon  appears on the LCD screen, the data stored in the meter will be automatically uploaded to the PC. This program will sort the pH and mV measurement and show the data in category.

7.5.2. Storage during operation

When the program is running, press **<M+/RM>** key to store data. All the measurement value will be uploaded to the PC through RS 232 and will not be stored in the meter. Storage data during operation will be the same with which displays on the meter. If timing measuring mode is set, the time curve will be showed on the interface as well as the measurements.

7.5.3. Data processing

Press “Export” key to export the stored value to Microsoft Excel file and then analyze or print the stored data.

8 Recommended pH Electrodes for Specific Applications

Application	Ideal Apera pH Electrodes to Use with MP511 Meter
Regular water solutions	201T-F, LabSen 213
Beverage, beer, or wine analysis	LabSen 213
Cosmetics	LabSen 851-1, (MP500 temp. probe required)
Dairy products (milk, cream, yogurt, mayo, etc.)	LabSen 823
High-Temperature liquid	LabSen 213
Low-temperature liquid	LabSen881 (MP500 temp. probe required)
Meat	LabSen 763
Micro sample testing	LabSen 241-6, LabSen 241-3 (MP500 temp. probe required)
Purified Water (Low ion concentration samples)	LabSen 803, LabSen 813
Soil	LabSen 553
Solid or semi-solid samples (cheese, rice, fruit, etc.)	LabSen 753
Strong acid samples	LabSen 831 (MP500 temp. probe required)
Strong alkalined samples	LabSen 841 (MP500 temp. probe required)
Surface test (skin, paper, carpet, etc.)	LabSen 371 (MP500 temp. probe required)
Titration	LabSen 223

TRIS buffer solutions	LabSen 213, LabSen 223
Viscous liquid samples	LabSen 223, LabSen851-1
Wastewater or emulsion	LabSen 333

*** Visit http://aperainst.com/electrodes contact us at 1-614-285-3080 for more details.**

9 Warranty

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

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