



INSTRUCTION MANUAL



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INSTRUCTION MANUAL FOR

PL-600

Lab pH Meter



PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

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1. Introduction

We thank you for having purchased PL-600 lab pH meter.

Before using the instrument, please note that the operation instructions should be read carefully, which will help you to operate and maintain the instrument, as well as to avoid trouble caused by unsuitable operation and maintenance.

PL-600 pH meter employs leading edge technology with integrated microprocessor, which is suitable for pH and mV measurement in water solutions for institutes, industrial labs and production fields.

The information presented in this manual is subject to change without notice as improvements are made.

2 . Technical data

2.1 Instrument can be used under following condition :

- a. Ambient temperature : 5 ~ 35°C ;
- b. Relative humidity : $\leq 85\%$;
- c. Power supply : DC9V power adapter;

2.2 Main parameters

2.2.1 Measurement arrange

pH : 0.00 ~ 14.00 pH

mV : ± 2000 mV

Temperature : -5.0 ~ 105.0°C

2.2.2 Resolution : 0.01pH、 1mV、 0.1°C

2.2.3 Measurement precision :

pH : ≤ 0.01 pH

mV : $\leq 0.1\%$ F.S

Temperature : $\leq 0.5^\circ\text{C}$

2.2.4 Input current : $\leq 10^{-12}\text{A}$

2.2.5 Input impedance : $\geq 10^{12}\Omega$

2.2.6 Stability : $\leq 0.01\text{pH}/3$ hrs

2.2.7 Temperature compensation range : 0.0 ~ 100.0°C

2.2.8 Storage capacity for measurement data : 64 sets ;

2.2.9 Content of storage : number of measurement value、 measurement value、 temperature value、 ATC or MTC status、 measurement date、 measurement time

2.2.10 pH buffer which are suitable for the instrument:

standard PH buffer : PH4.00、 PH7.00、 PH10.01

2.2.11 Communication port : RS232

2.2.12 Dimension of encluse : 200×160×65mm

2.2.13 Weight : 0.65 kg

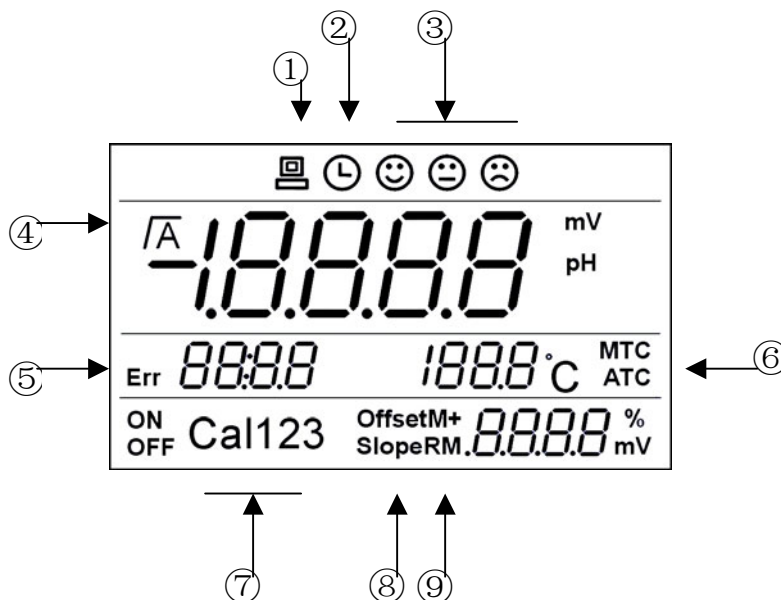
2.2.14 Power : ≤5W

3. Installation of accessories

Install the arm of the electrode holder on the base.

Plug the pH combination electrode and DC9V power adaptor into relative socket. As soon as you have connected the DC9V power adaptor to AC220V(or AC110V), the instrument is in hold mode.


4. LCD icon



In above picture :


Icon ① : RS232 communication 

When this icon displays, the instrument has been connected with PC, the RS232 communication function is open automatically.

Icon ② : Timing storage of the measurement value  (only valid for type 640) When this icon displays, the measurement value timing storage function is open, the instrument will store the measurement data according to set intervals.

Icon ③ : Sensor diagnostics  ,  , 


After pH sensor calibration, the instrument will display sensor performance :


 : sensor is in good performance ;

 : sensor performance is so so ;

 : sensor is in bad performance, need to be changed

Icon④ : Measurement status icon  ,  :

 :when display this icon, the measurement value is in stable status, but the instrument still goes on measurement.

 : when display this icon , the measurement value is in stable poising status, the value will be kept(auto ending point function)

Icon ⑤ : Error icon Err

The instrument has self diagnostics function, when problems occurs during operation, the instrument will display relative tips for error signal and code, to remind you.

Icon ⑥ : Temperature measurement and pH temperature compensation status icon

MTC icon : the temperature displays is manual entered, pH manual temperature compensation.

ATC icon : the temperature displays is actual measurement value, pH temperature auto compensation.

Icon ⑦ : PH sensor calibration icon Cal1、 Cal2、 Cal3 :

Cal1 icon : first point pH calibration

Cal2 icon : second point pH calibration

Cal3 icon : third point pH calibration

Icon ⑧ : PH sensor performance icon

Offset icon : pH sensor zero point icon

Slope icon : pH sensor slope icon

Icon ⑨ : Measurement data storage, back display icon

M+ icon : measurement data storage icon

RM icon : stored measurement data back display

5. Operation key

The instrument has 6 operation keys , as follows :

ON/OFF: Power key. When switch off the instrument, but the power adaptor has not plugged from the AC220V socket, the instrument is in hold mode.

MODE: Function key. To be used to switch between measurement functions (pH measurement function/mV measurement function) .Long key used to functional parameter setting.

CAL : Calibration key. To be used to pH sensor calibration.

M+/\u039b : Storage key、 manual temperature setting key (increase), functional parameter setting key.

After the measurement data getting stable, is used to store the measurement information.

During pH measurement and calibration, when sample temperature is under MTC status, is used to setting the sample temperature manually. (increase)

Under the functional parameter setting condition, is used to modify the setting of the functional parameter.

RM/v : Back display key、 manual temperature setting key (decrease), functional parameter setting key

Under measurement mode , short key (press the key <1.5s) to back display stored measurement information ; long key (press the key >1.5s) to clear all stored measurement information.

In pH measurement and calibration process, when the sample temperature is under MTC mode, to set the sample temperature manually (decrease)

Under the functional parameter setting condition, is used to modify the setting of the functional parameter.

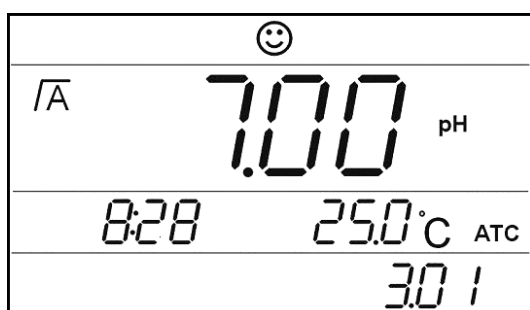
READ: Measurement key. This is a combination key. Press the key < 1.5s , the instrument in measurement mode. (short key) . Press the key $\geq 1.5s$, the instrument will set the auto ending point function or cancel the action (long key) .

6. Measurement

6.1 pH measurement

Remarks : Before first time using the pH sensor, the pH sensor should be calibrated.

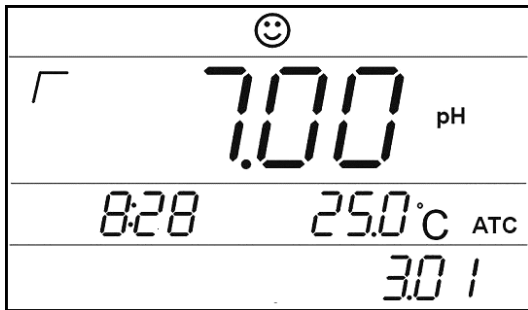
Under pH measurement mode, immerse the sensor into the sample after rinsing with distilled water, shaking the vessel few minute, must press “READ” key (short key) , when the LCD display “ \sqrt{A} ” auto ending function



icon, the instrument will block the measurement value, the value could be read. In left chart, the date is 1st March, time is 8 o'clock 28 , the sample temperature is 25.0°C , automatic temperature compensation (ATC) , auto

ending function , measurement value 7.00pH,the electrode is in good performance.

Under pH measurement mode, immerse the sensor into the sample after rinsing with distilled water, shaking the vessel few minutes, if the instrument has not been set to auto ending function, LCD will display



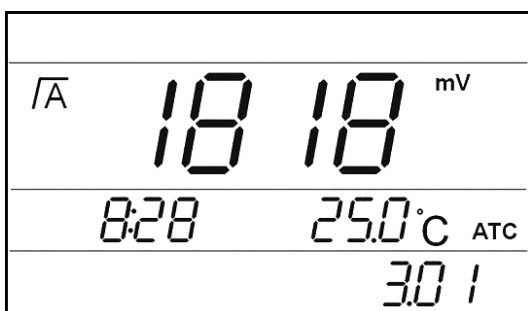
“√”icon if the measurement is stable, the measurement value could be read. In left chart, the date is 1st March, time is 8 o'clock 28 , the sample temperature is 25.0°C , automatic temperature compensation (ATC) , auto ending

function , measurement value 7.00pH,the electrode is in good performance.

Under pH measurement mode, when press <READ>key , “MTC” icon flashes , to remind you the current pH temperature compensation mode, is manual or automatic, as well as to confirm the sample temperature displayed, then press < M+/\>key、 <RM/v>key to modify the sample temperature, then press , <READ>key to confirm the entered temperature value and measure.

6.2 mV measurement

Under mV measurement mode, immerse the sensor into the sample after rinsing with distilled water, shaking the vessel few minute, must press



“READ” key (short key) , when the LCD display “√A” auto ending function icon, the instrument will block the measurement value, the value could be read. In left chart, the date is 1st March, time is 8 o'clock 28 , the sample

temperature is 25.0°C , automatic temperature compensation(ATC) , auto ending function , measurement value 1818mV.

6.3 Set measurement ending point judgment status

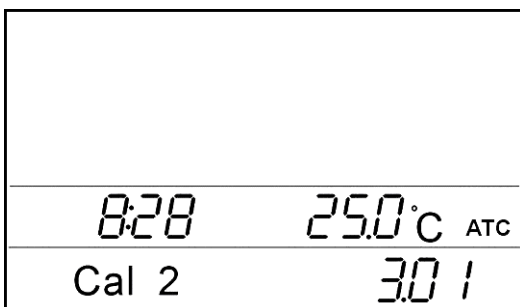
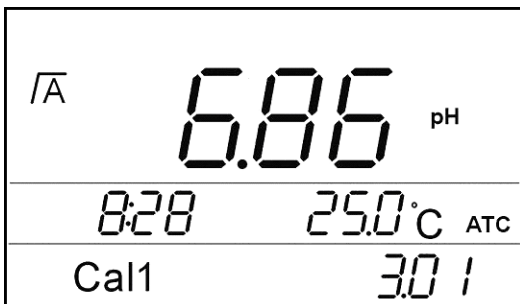
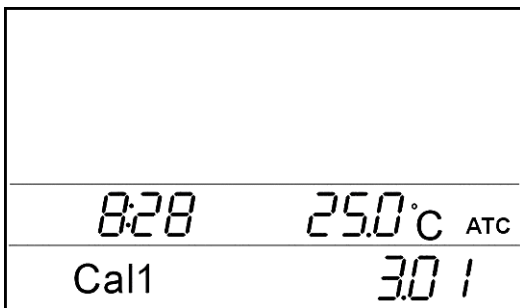
The instrument has 2 statuses of measurement ending point judgment(display“√”or “√A”icon) , under the measurement mode, (PH

or mV measurement) , press <READ> long key to change the status.

When the measurement is in balance status, “√A” displays , the instrument will keep this value, the measurement is end; when the measurement is in stable status, “√” displays , the measurement value could be recorded, and the measurement is continuing, according to the balance stability, to be sure if display “√” or not.

7. pH sensor calibration

1 point calibration

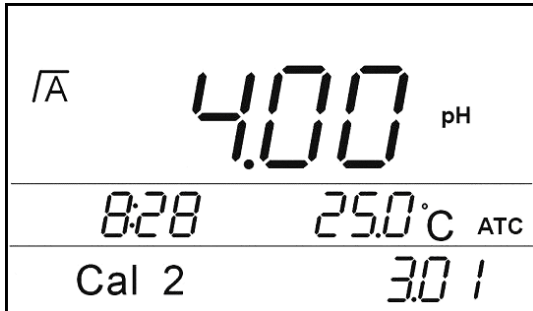


Under the pH measurement mode, press<CAL>key , LCD displayed as left chart,“Cal1”icon flashes , immerse the electrode into the standard buffer after rinsing with water, shake the vessel for few minutes, wait for few seconds, press<CAL>key , the instrument will recognize which buffer solution is it, display as well, wait the instrument judge pH sensor response to ending point, display as chart left, 1 point calibration is accomplished the display shows below, “Cal2”flashes , the instrument reminds you 1 point calibration is finished, do you want to proceed 2 points calibration? If only 1 point calibration needed, press “READ”to exit calibration process, switch to pH measurement mode. If the 2 points calibration is needed, the next chapter

should be followed by the operator.

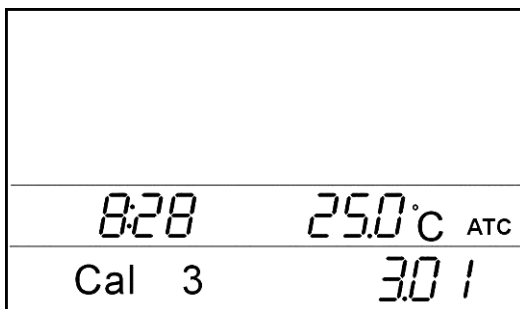
Remarks : After 1 point calibration, only the zero potential of the sensor is modified (Offset), the slope of the pH sensor is kept from last calibration. Even to those electrodes which have good performances, 0.05pH measurement error could be reached during measurement.

2 points calibration



After 1 point calibration, LCD displays as above chart (“Cal2”flashes), immerse the electrode into standard buffer solution, shaking the vessel for few minutes, wait for second, press“CA L”, the instrument will recognize which buffer

solution is it, display as well, wait the instrument judge pH sensor response to ending point, the instrument displays as above chart, 2 points calibration has been accomplished, automatically enter the pH measurement mode, the display shows below, “Cal3”flashes , the

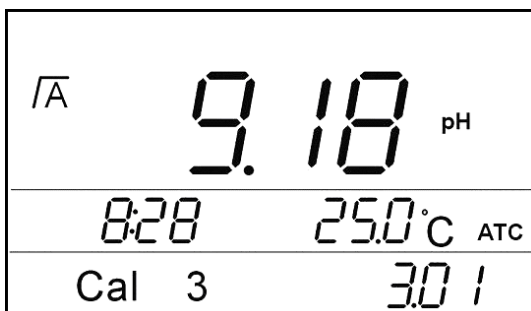


instrument reminds you 1 point calibration is finished, do you want to proceed 3 points calibration? If only 2 point calibration needed, press “READ” to exit calibration process, switch to pH measurement mode. If the 3 points

calibration is needed, the next chapter should be followed by the operator.

Remarks: After 2 points calibration, the instrument will modify the offset and slope of the electrode. PH measurement under this kind of calibration status, the measurement precision is quite good.

3 points calibration



After 2 point calibration, LCD displays as above chart (“Cal3”flashes), immerse the electrode into third standard buffer solution(e.g. PH9.18 Buffer), shaking the vessel for few

minutes, wait for second, press“CA L”, the instrument will recognize which buffer solution is it, display as well, wait the instrument judge pH sensor response to ending point, the instrument displays as above chart, 3 points calibration has been accomplished, automatically enter the pH measurement mode, the sensor performance icon after calibration is also displayed.

After 3 pints calibration, the instrument has the best measurement precision. Especially for broadly ranged pH measurement, the measurement errors from nonlinearity will also be modified.

During pH calibration, “MTC” icon on LCD displays , to remind you current temperature compensation method, is manually (MTC), and please confirm the temperature of current sample, press < M+/\>, <RM/v>key to modify the temperature of the sample, then press <CAL>key to confirm the temperature imputed and start with pH sensor calibration.

8. Measurement information store, back display, clear and RS232 communication

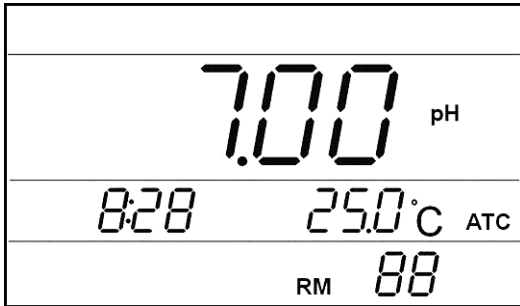
8.1 Store measurement information manually

During PH or mV measurement, when the measurement value is stable,(display “√” or “√A” icon), when the auto storage function of type 640 meter is set to “Off”,press< M+/\>key ,store the current measurement value (including measurement value number, measurement value, temperature value (ATC or MTC status), measurement date, measurement time),LCD will display icon **M+**, together with measurement value store number in around 5 minutes, then back to last measurement status. (display date on the position of storage number display) .

8.2 Back display of measurement information

Under measurement status (PH or mV measurement), press< RM/v >short key , the instrument will back display of last stored measurement data (including measurement value number, measurement value, temperature value (ATC or MTC status), measurement date, measurement time) .

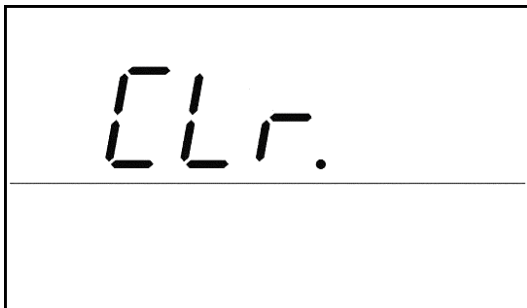
In below chart, measurement value number is 88 , 7.00pH , measurement time 8:28 (display measurement date and measurement




time alternatively) , sample temperature is 25.0°C (ATC) .

Under the back display mode, the instrument will pause operation of the timing storage of the measurement information. (Only valid for type 640) .

8.3 Clear stored measurement information





When the instrument memory is full, will not store the measurement information; or the information stored is not needed anymore, clear the memory is needed. Under the measurement mode(PH or mV measurement) ,press<

RM/v>long key , LCD is displayed as left chart, icon  flashes , to remind you clear the memory, if this operation is confirmed, then press< RM/v>short key to finish clearing of the memory; if this action is not needed , press< READ>short key to abort, return to measurement mode.

Remarks : The measurement information cleared will not be recovered!

8.6 RS232 communication

After installed the communication software supplied by or company on the PC, when connect PC and the instrument using the RS232 communication cable, LCD will display RS232 communication icon  , to show that the instrument has been connected with PC.

When the LCD displays RS232 communication icon  , the manual saving, auto saving, timing saving information (includes measurement value number, measurement value, temperature value (ATC or MTC), measurement time, measurement date) will be transferred through RS232 port to PC. Otherwise, the manual saving, auto saving, timing saving information (includes measurement value number, measurement value,

temperature value (ATC or MTC), measurement time, measurement date) will be stored in memory of the instrument.

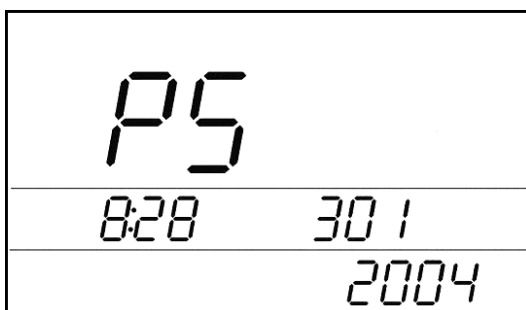
9. Functional parameter setting

Press <MODE> key longer than 1.5s, the instrument comes into functional parameter setting mode. Under this mode, operator could check, modify and set the relative information, parameter and function. Under this mode, using <MODE>, <M+/\>, <RM/v> 3 short keys to set the procedure parameter: <MODE> short key is used to cycle choosing functional parameter setting items, <RM/v> key, <M+/\> key are used to modify the process functional status and parameters. Press<MODE>long key to protect procedure setting item parameters and end procedure parameter setting status, back to formal status.

9.1 Electrode calibration information (P1)

Under this status, the operator could check the calibration information. Press <MODE>long key to enter the program parameter setting status "P1", the LCD displays as left chart. Press< M+/\>short key to display zero potential of the pH sensor (Offset) mV value, Slope value alternatively. Information displayed in left chart : the calibration date of PH sensor is 1st of March (display calibration date and calibration time alternatively); calibration method is 2 points calibration; temperature of the solution is 25.0°C (ATC); PH sensor zero point (Offset) is 0.0mV.

9.2 Date and time setting(P2)



Factory setting of the instrument is according to current Beijing date and time. Press <RM/v> key to choose the number to set, press<M+/\>key to modify the number. The instrument has set to 24 hours. The left chart is 1st

March, 2004, 8:28.

10. Self diagnostic information

The instrument has self diagnostics function, during operation, relative information will be reminded by the instrument, to solve problems during usage:

Err1: Electrode potential $\geq 2000\text{mV}$ 。 Please check if the instrument has been connected with the sensor, the electrode has been hanged in air, or the electrode has damaged.

Err2: Electrode potential $\leq -2000\text{mV}$ 。 Please check if the instrument has been connected with the sensor, the electrode has been hanged in air, or the electrode has damaged.

Err3: pH value $> 15.00\text{pH}$ 。 Please check if the instrument has been connected with the sensor, the electrode has been hanged in air, or the electrode has damaged.

Err4: pH value $< -1.00\text{pH}$ 。 Please check if the instrument has been connected with the sensor, the electrode has been hanged in air, or the electrode has damaged.

Err5: Memory is full, could not store measurement information. Please record and store measured information and clear all information in the memory

Err6: Electrode potential during calibration over ranged selected pH buffer set. Please check if the instrument has been connected with the electrode, the electrode has damaged, if pH buffer selection is correct, then recalibrate the electrode.

Err7: pH electrode zero point potential over range. Zero point potential Offset $< -60\text{mV}$, Offset $> 60\text{mV}$. The instrument will not allow you to operate. Please check if there is air bubbles in electrode head, if the buffer selection is correct, the pH buffer is in good quality, then recalibrate the electrode. If the error still occurs, please change the electrode.

Err8: pH slope over range Slope $< 85\%$, Slope $> 105\%$ 。 The instrument will not allow you to operate. Please check if there is air bubbles in electrode head, if the buffer selection is correct, the pH buffer is in

good quality, then recalibrate the electrode. If the error still occurs, please change the electrode and calibrate the electrode.

Err9 :During 2 point/3point calibration, instrument judge 1point (or 2 points) which used buffer solution are same (or the electrode has damaged), the instrument will judge the reliable calibration operation and modify the relative electrode parameter. If this occurs, please recalibrate the pH electrode.

11. Maintenance of the instrument

The performance of the instrument, is not only rely on the self construction of the instrument, but also on good maintenance. Especially for pH meter, which high impedance is needed, and corrosive chemical agents is sometimes contaminated, therefore, necessary maintenance is a must

Please, only when the instrument is power off, the plug of the adaptor could be removed.

Please keep the instrument away from directly sunshine, otherwise the life time of the LCD will be shortened.

The pH value of the sample solution should be between the pH buffer solutions you selected. If the temperature of the buffer solution during calibration is same as the temperature of the sample, the highest resolution will be reached by the instrument.

Temperature compensation function in the instrument is only effected to compensate the sample temperature changes according to pH sensor.

The electrode plug should always keep high cleaning and dry. In order to protect the electrode from broken, please do not contact the head of the electrode with hard materials, since it is very thin. Please refer to the instruction manual of the electrode for the storage, cleaning and maintenance of the electrode.

Please do not contact the central part of the BNC electrode plug by

hand or metal, the static electronic will destroy the electronic part of the instrument and contaminate the input terminal of the electrode, decrease the input impedance of the instrument.

Please do not use agent to clean the enclosure of the instrument. The enclosure of the instrument is ABS engineering plastics.

11 . Packing accessories

Operation manual, QC certificate are included in the package of the instrument, as well as accessories below,

1. 1pcs of pH combination electrode ;
2. pH 4、 7, buffer solution 1 bottle each ;
3. 1 set of electrode holder ;
4. 1pcs of DC9V power supply ;

13. Warranty period

The warranty period of electronic components is 2 years from the date of purchase, under the condition of normal storage, operation and transportation, improper working of the instrument due to quality problems, the instrument will be repaired and the spare parts will be changed for customers with supplying of the sales invoice and product inspection certificate.

Appendix 1 Checking method of pH linear error

Input 177.48mV(pH4.00 buffer solution electrode potential simulate value)、-178.07mV(pH10.01 buffer solution electrode potential simulate value) into the instrument , temperature compensation sent to 25°C , operate according to 2 points calibration ; after calibration the instrument displays “ 😊 ” signal.(if type 640 please set the buffer solution set to b1)Check the linear error of the instrument according to following table.

mV	414.11	354.95	295.80	236.64	177.48	118.32	59.16	0
pH	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00
mV	-414.11	-354.95	-295.80	-236.64	-177.48	-118.32	-59.16	
pH	8.00	9.00	10.00	11.00	12.00	13.00	14.00	