

# INSTRUCTION MANUAL



## LLG-pH METER 7

Art.No. 6.263 600

Thank you very much for purchasing this LLG-pH METER 7.

Please read the following instructions carefully and always keep this manual within easy reach.

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## 1. Preface

pH meter is a kind of wide used general instrument in many different applications.

A typical pH meter consists of two parts: a measuring probe and an electronic meter.

The measuring probe includes glass probe and reference electrode, called pH electrode. Today pH electrode normally has a built-in temperature sensor, calls 3 in 1 pH electrode.

### **Measuring principal:**

$$E = E^{\circ} - (2.3 RT/nF) * pH \dots \dots \dots \text{Nernst equation}$$

<b>E</b>	measured potential (mV)
<b>E<sup>o</sup></b>	standard electrode's potential (mV)
<b>R</b>	the ideal gas constant (8.3144 J/K)
<b>T</b>	the temperature in Kelvin (K)
<b>n</b>	the number of moles of electrons transferred in the cell reaction or half-reaction (H <sup>+</sup> =1)
<b>F</b>	Faraday's constant (96485 C mol <sup>-1</sup> )

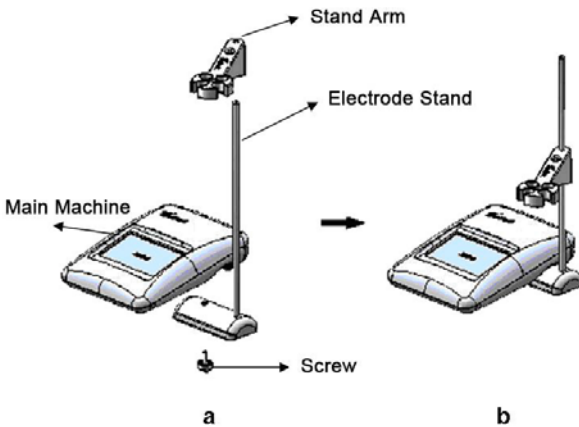
## 2. Installation

Please instruction manual carefully before using this instrument: read this

- Check the meter and the accessories according to the enclosed packing list.
- Unpack the meter, connect it with the power line in the box, plug the power line to the local power supply. The display screen should be lighted, press '▶' key, the meter is ready for use.
- If the user needed to transfer data to a computer while measuring, please connect a cable between the computer and the RS232 socket of the meter before starting measurement.

### Note:

*The meter could be switched on again in 24 hours by touching any place on the screen (3 seconds) if the meter is switched off by pressing the red "off" key on the screen. Unplug the power and plug it again to switch the meter on if the meter has not been used for more than 24 hours. This is for protecting the meter and energy saving.*



**Fig. 1:**  
**The illustration of**  
**pH meter installation**

**Fig. a** is the assembly of parts  
**Fig. b** shows the meter ready for use

### Installation:

*Put the electrode stand base under the pH meter, mount the base and the meter using the supplied screw. Press the button on the electrode stand arm to install it.*

### Attention:

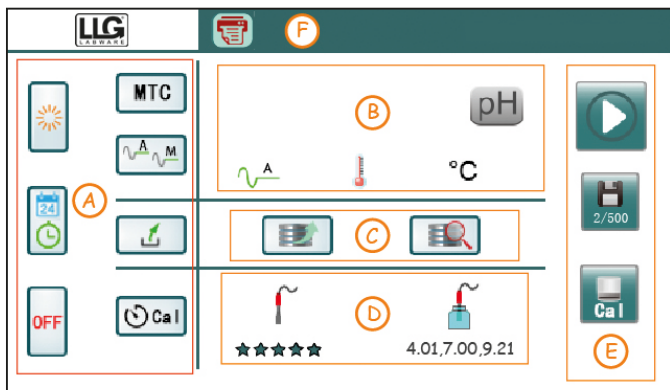
*Keeping the supplied protective cover on the device while operating it may affect the functioning of the touch display. For proper results, we recommend to remove the protective cover.*

### 3. Instruction

#### 1. The main measurement screen and functional keys

The display of this instrument is 5" TFT color LCD touch screen. The operator can touch any icon on the screen except

the measurement reading to operate the instrument. **Fig. 2.**


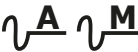



**Fig. 2:**  
**The illustration of the main screen of the pH meter**



#### 1.1 Area A System and measurement settings of the instrument

	Key for date and time adjustment.		Screen lightness adjustment.
	Switch off key. Press this key to switch off the instrument.		
MTC	Manual temperature compensation. For MTC temperature setting		
	End point selection. A- auto endpoint. M- manual endpoint.		
	Online data transfer. Press this icon, user can transfer measurement result to PC or printer. For data transfer to PC, please follow the instruction in the software package.		
	Electrode calibration reminder. Press this key to input the time, day, to remind the user calibrate the electrode on time.		


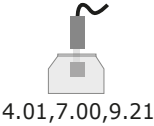
### 1.2 **Area B** **Measurement Result Display**

	Measurement result unit., press it to make an alternate display.
	Endpoint. A-automatic, M-manual.
	Temperature in Celsius degree.






### 1.3 **Area C** **Database**

	Press this icon for data in database transfer.
	Press this icon for review data in database.




### 1.4 **Area D** **The electrode status and the buffer solution**

	The electrode status. 5 ... 3 star is the minimum requirement for good measurement. Press it to review the electrode calibration data.
	The buffer solutions selected for the electrode calibration. Press it to view the electrode calibration data.

### 1.5 Area E Operation keys

	Press it to start a measurement or make a confirmation.
	Press to end a measurement process manually.
	Press to save current reading.
	The current datum has been saved.
	Press to start the calibration process.

### 1.6 Area F Navigation bar

	The date and time set by the operator.
	PC or Printer. The operator selected.
	Press this logo, the user can view the information of this meter, such as S/N, software version, restore the factory settings and the instruction menu.

### **Restore factory settings: all the settings will be replaced by the default settings.**


Item	Default setting	Item	Default setting
MTC	25.0 °C	Database	remain
Endpoint mode	auto	Electrode calibration curve	100 %
Data transfer	Off	Buffer solutions	Europe standard
Calibration Reminder	None	Screen brightness	Medium


## 4. Measurement process



It's recommended to perform an electrode calibration before measuring a sample. If the electrode is calibrated in short time,

the sample measurement can be conducted directly.

### 1. Calibration

If the electrode without temperature compensation is used, "MTC" will be displayed on the main screen, press  on the main screen, user can set up the calibration buffer solution temperature. If a 3-in-1 electrode is being used, or a temperature electrode is used at the same time, "ATC" will be displayed on the main screen and the calibration buffer solution temperature will be measured automatically.

Press the  on the main screen, select one of the standard buffer solutions groups built-in. **The selected standard buffer solution group must match the buffer solution group actually used.**

Press  on the main screen, the calibration window pop-up, **Fig. 3**, put the electrode in the first buffer solution, press  to start the calibration.

When the endpoint reached, take the electrode out and wash it with DI water, dry it, put it in the second buffer solution for second point calibration, same procedure for the third point calibration.

The calibration data will be stored in the database after press the return key.



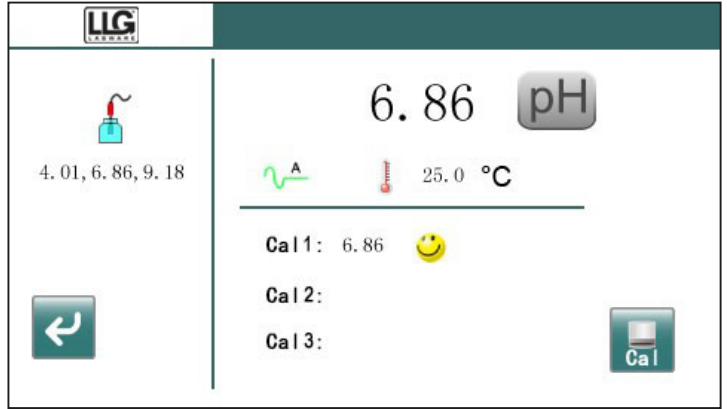
This icon means the calibration result meets requirement



Means the result is not under satisfaction.

#### Notice:

- *During the calibration process, if the red wave line is shining, means the calibration is going on, if press "return" at this time, the calibration process will stop and go back to the main screen.*
- *Calibration buffer solutions selection: normally, the pH values of the selected calibration buffer solutions are similar to the pH of the sample solutions to be tested.*

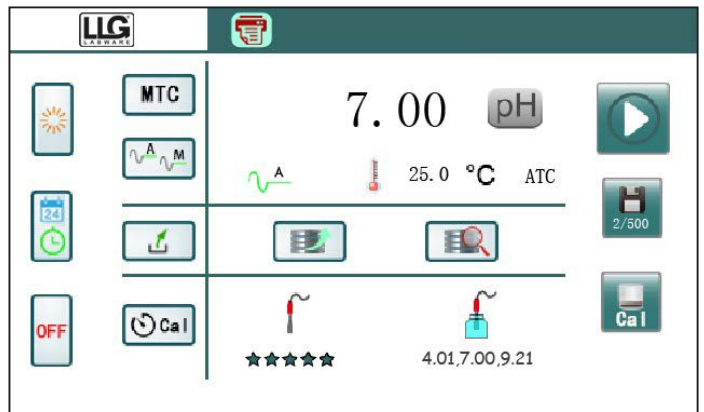


**Fig. 3:**  
The illustration  
of the electrode  
calibration

## 2. Measurement

Wash the electrode with DI water, dry it, put it in the sample solution, stir the solution with electrode slightly.

Press key on the screen starting the measurement. Press on the screen after the endpoint reached, saving measurement result to database. **Fig. 4.**



**Fig. 4:**  
The illustration of  
measurement



## 5. Technical Specifications

<i>Parameter</i>	<i>Model</i>	<i>ph-Meter 7</i>
<b>Measurement mode</b>		pH/mV
<b>pH range (pH)</b>		-2.00 to 20.00
<b>Resolution (pH)</b>		0.01
<b>Accuracy (pH)</b>		± 0.01
<b>mV range (mV)</b>		-2000 to 2000
<b>Resolution (mV)</b>		1
<b>Accuracy (mV)</b>		± 1
<b>Temperature range (°C)</b>		MTC: -5.0 to 105.0 °C ATC: -5.0 to 105.0 °C
<b>Temperature Accuracy (°C)</b>		± 0,5 °C
<b>Calibration</b>		3 predefined pH buffer groups, automatic buffer recognition
<b>Database</b>		500 groups measuring data
<b>Data output</b>		RS232, Printer (optional), IS-Link
<b>Display</b>		5.0" color, touch screen, Resolution 480*720
<b>Power</b>		9V DC/1A
<b>pH Input</b>		BNC, Impedance>10 e+12 Ω
<b>Temperature input</b>		NTC 30 KΩ
<b>Order No.</b>		<b>6.263 600</b>
<b>Configuration</b>		IS126 Meter, YE203 electrode, Electrode stand, Protective cover

## 6. Self-diagnostic

During the instrument operation process, some signs might appear on the main screen, this is the information of the

instrument self-diagnostic, which will help you to find out some problems of the instrument or the electrode you are using.

### 1. Electrode Status:

<i>slope</i> \ <i>offset</i>	<i>&lt; 15 mV</i>	<i>15 mV ≤ offset ≤ 35 mV</i>	<i>&gt; 35 mV</i>
<b>95 % ≤ slope ≤ 105 %</b>	★★★★★	★★★★☆	★★☆☆☆
<b>90 % ≤ slope ≤ 95 %</b>	★★★★☆	★★★★☆	★★☆☆☆
<b>85 % ≤ slope ≤ 90 %</b>	★★☆☆☆	★★☆☆☆	★★☆☆☆
<b>slope &gt; 105 % slope &lt; 85 %</b>	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆

## 2. Calibration Error messages:

If the 😞 icon comes out follow the calibration point, the possible reasons are below:

<b>Error message</b>	<b>Possible reasons</b>
<i>Buffer solutions temperature has a big difference from the pointed temperature.</i>	The temperature difference between the measured buffer solution and the defined buffer solution is bigger than $\pm 0.5$ °C.
<i>Buffer solution temperature is out of range</i>	Standard calibration buffer solution group: the temperature of the measured buffer solution or the MTC temperature not in the temperature 0.0 – 60.0 °C range.
<i>The offset of the electrode is out of range</i>	<ol style="list-style-type: none"> <li>1. The buffer solution in use is not matched with the selected buffer solution group.</li> <li>2. The buffer solution is not in good condition.</li> <li>3. The electrode used is not in good condition or has been damaged.</li> </ol>
<i>Wrong buffer solution</i>	<ol style="list-style-type: none"> <li>1. The same buffer solution used for second or third point for calibration.</li> <li>2. The electrode used is not in good condition or been damaged.</li> </ol>
<i>The calibration Slope of the electrode is out of limit</i>	<ol style="list-style-type: none"> <li>1. The buffer solution used is not matched with the selected buffer solution</li> <li>2. Buffer solution is not in good condition</li> <li>3. The electrode used is not in good condition or been damaged.</li> </ol>

## 7. Maintenance

The pH probes used in modern laboratories are combination electrodes. The advantages of these kinds of electrodes are: easy to be used, avoiding the effects of the oxidizing or reducing substances to the electrodes, quick balancing in solution. Below are brief introductions of the electrode and its maintenance.

1. If the electrode is not in good condition: failure or performance degradation, the operator can't get an accurate measurement results or even can't perform the measurement.
2. The electrode bulb must be immersed in the 3 mol/L KCl solution for 24 hours for the first time use (if there is no solution in the protective sleeve) or the electrode is not used for quite a long time.
3. Cover the electrode bulb with the protective sleeve which contained KCl solution after each time used. The reference internal KCl solution, inside the electrode tube, must reach the half level. Pull the plug on the top of the electrode out when take a measurement. Put it back when finished the measurement.
4. The electrode should not be immersed in the DI water, protein solution or acidic fluoride solution for a long time. The electrode should be avoided contacting with the organic silicone oil.
5. Immerse the combine electrode bulb in 3 mol/L KCl solution after use. Do not use any detergents or other water-absorbing agents to wash the electrode.
6. Inspect the glass bulb before using the electrode. The bulb should be transparent, no cracks, no air bubbles inside and full of solution.
7. Shorten the measuring time when take a pH of a high concentration solution, wash the electrode carefully after using it. Avoid the adhesion and condemnation of the electrode.
8. After wash the electrode, do not wipe the glass bulb but use a filter paper to dry it. This will avoid the damage of the glass membrane, cross condemnation which may affect the measurement accuracy.
9. The electrodes cannot be used to measure the pH of strong acids, strong bases and other corrosive solutions.
10. The electrode is prohibited to use in dehydration solutions such as anhydrous ethanol, potassium dichromate solutions.
11. The electrode bulb is very thin glass film, avoid touch it with other hard object.
12. Do not immerse the combination electrode in DI water for long time. Put the electrode bulb in the bottle which filled with protective solution, in order to make the electrode remain active. Protective solution: one packet of pH 4.00 buffer solution (250 ml), plus 250 ml DI water, plus 56 g KCl (analytical reagent), stir it till the KCl solid dissolved.
13. Choose the appropriate pH probe to measure the matched samples, e.g. measuring strong acid, strong base or DI water.

14. Do not use hand or metal object to touch the center of the electrode socket on the instrument. Put the short circuit plug or the electrode plug on when the instrument not in use. This will avoid the dust or moisture to affect the instrument and have affection of the accuracy of the measurement.
15. The instrument shell is made of ABS. Organic solvent is not recommended for the shell cleaning.
16. To get a more accurate result, the pH value of the measured sample should be in range of the calibration buffer solutions'pH values, the temperatures of the sample should be the same as the calibration buffer solution
17. Do not use the expired standard buffer solution, do not put the used standard buffer solution back to the storage bottle. If the standard buffered solution is turbidity, moldy or precipitation, discard it.
18. Keep the pH buffered solution in the refrigerator after usage. For the base buffered solution, the storage time is shorter because the CO<sub>2</sub> in the air is easy to be absorbed by it and cause the change of the pH value.
19. Keep the instrument away from the direct sunlight, which might shorten the lifetime of the LED screen.

## 8. Attention



1. The samples, the electrode performance and the requirement of measurement accuracy, these factors will determine how frequent to calibrate the instrument. Higher accuracy ( $\text{pH} \leq \pm 0.02$ ) needs more accurate standard buffered solution and calibrates the instrument frequently. For accuracy ( $\text{pH} \geq \pm 0.1$ ), one time calibration can last one week or even longer time for measurement process.
2. Re-calibration is needed under these conditions:
  - a) A new electrode or a long term unused electrode is used to measure a sample;
  - b) After measuring strong acid solution ( $\text{pH} < 1$ ) or a strong base solution ( $\text{pH} > 12$ );
  - c) After measuring a solution containing fluoride or concentrated organic solution;
  - d) There is a big difference between the temperature of the sample and the calibration buffer solution.
3. Press MTC on the main screen to compensate the temperature manually if the temperature electrode is not in used.
4. Preparation of the electrode protective solution: dissolve 25 g KCl (A.R) in 100 ml DI water. The electrode should not be immersed in DI water, protein solution or acidic fluoride solution for a long time.

5. For higher measurement accuracy, the instruments should be calibrated by a standard buffer solution. The used standard buffer solution should be discarded after several times used.
6. Keep the instrument clean and dry, especially the socket of the electrode in the meter. Use the cotton and anhydrous ethanol to clean these sockets and dry them.
7. Wash the electrode bulb with DI water before and after the measurements. Dry it with filter paper,
8. (a) The glass bulb condemnation or aging: immerse the electrode in 0.1 mol/L HCl solution (9 ml concentrated HCL solution is diluted with DI water to 1000 ml) for 24 hours, wash it with DI water. Then immerse it in the 3 mol/L KCl solution for another 24 hours to activate it. Or immerse the glass bulb in 4 % HF solution for 3 – 5 seconds, wash it with DI water, then immerse the glass bulb in 3 mol/L KCl solution for 24 hours to activate it.

(b) Cleaning of the glass bulb and pollution: (for reference)

<b>condemnation</b>	<b>Cleaner</b>
<i>Inorganic metal oxide</i>	diluted acid (<1 mol/L)
<i>Organic grease</i>	Diluted detergent (weak alkaline)
<i>Polymer resin</i>	Diluted alcohol, acetone, ethyl ether
<i>Protein cell sediment</i>	Acid enzyme solution (yeast tablets)
<i>Pigment substance</i>	Diluted bleach, peroxide

9. One year is the lifetime of an electrode usage. The lifetime will be shorter if the electrode is used in the harsh conditions or maintenance improperly. The aged or failed electrode should be replaced with new one for good measurement result.
10. Unplug the power supply after the meter is switched off. Don't unplug the power supply code when the meter is on.

## WARRANTY REPLACEMENT

This product is warranted to be free from defects in material and workmanship for a period of three (3) years from date of purchase.

This warranty is valid only if the product is used for its intended purpose and within the guidelines specified in this instruction manual. This warranty does not cover damage caused by accident, neglect, misuse, improper service, natural forces or other causes not arising from defects in original material or workmanship. This warranty does not cover any incidental or consequential damages, commercial loss or any other damages from the use of this product.

The warranty does not cover damage to paint or finish and defects or damages caused by physical and chemical abuse or normal wear and tear. The warranty is invalidated by any non-factory modification, which will immediately terminate all liabilities on us for the products or damages caused by its use. The buyer and its customer shall be responsible for the product or use of products as well as any supervision required for safety. If requested the products must be returned to the distributor in well packed and insured manner and all shipping charges must be paid.

Information on the disposal of electrical and electronic devices in the European Community:

The disposal of electrical devices is regulated within the European Community by national regulations based on the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). According to these regulations, any devices supplied after 13.06.05 in the business to business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. They are marked with the following symbol to indicate this. As disposal regulations within the EU may vary from country to country, please contact your supplier if necessary.

### PRODUCT DISPOSAL



In case the product is to be disposed of, the relevant legal regulations are to be followed.



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