



NEC MET

Instruction Manual

pH-200L (*pH/mV/Temp Meter*)

pH-220L (*pH/mV/ORP/Temp Meter*)

pH-240L (*pH/ISE/mV/ORP/Temp Meter*)

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Laboratory pH Meter (Model No. pH-200L,pH-220L,pH-240L)

Chapter I. Introduction

istek's Desktop Meter pH-200L (pH/mV/Temp Meter), pH-220L (pH/mV/ORP/Temp Meter), pH-240L (pH/ISE/mV/ORP/Temp Meter), the latest- models are operated by AC/DC adaptor(DC 9V) and controlled by microprocessor for all measurement needs.

istek's Desktop pH/mV/TEMP Meters feature a custom LCD that simultaneously displays various functions along with measurement results. These istek's laboratory pH Meters are high-performance for more accurate measurement and also its operating method was designed in the position of user.

These laboratory pH Meter have auto calibration (3 points) and manual calibration (3 points). When a pH reading is stable, "S (Stable)" is displayed in the left field of LCD, therefore user can get a stable data(results) of the sample easily. Each Data-log is 100Points

These models can be controlled remotely via RS232C interface.
Refer to Chapter VI. Remote Control Part.

This model displays pH, mV,(ORP),(ISE) and ATC(°C).

pH	indicates power of hydrogen(H+). (unit pH) $pH = -\log_{10}[H^+]$
mV	indicates electromotive force of each ion. (unit mV)
ORP	indicates a relative potential. (unit mV)
ISE	indicates concentration of any given ion. (unit mg/L) To measure an ion must use electrode which according to the type of ion, selectively response to only any given ion.
ATC	For automatic temperature compensation, a temperature probe supplied by istek must be used. Temperature Compensation is automatically performed while measuring.

Laboratory pH Meter (Model No. pH-200L,pH-220L,pH-240L)

Chapter II. General Functions

1) Instrument Setup

Rear Panel



Power Source

Connect the supplied AC/DC adaptor to the meter.
pH meter of Istek Inc., is operated by DC 9V300mA Adaptor

pH Electrode Connection

Attached Electrode by sliding the BNC connector onto the sensor input then push down and turn clockwise to lock into position.

ATC probe Connection

Attach the ATC probe to the ATC jack by sliding the connector straight on until firmly in place.

Recorder Connection

When the recorder is used, connect the recorder to the meter. Out voltage is $-1999.9 \sim +1999.9$ mV with impedance of 600Ω .

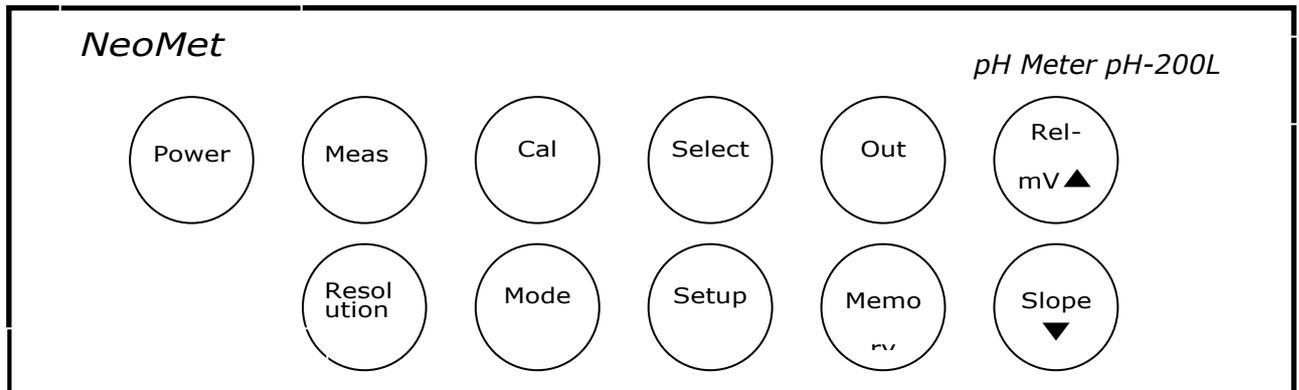
Printer and RS232C interface Cable Connection

Insert printer and RS232C interface cable into the RS232C jack. Use interface cable supplied by *istek*. See the Chapter VI Data-Log

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2) Keypad Functions

■ pH-200L (pH/mV/TEMP Meter)

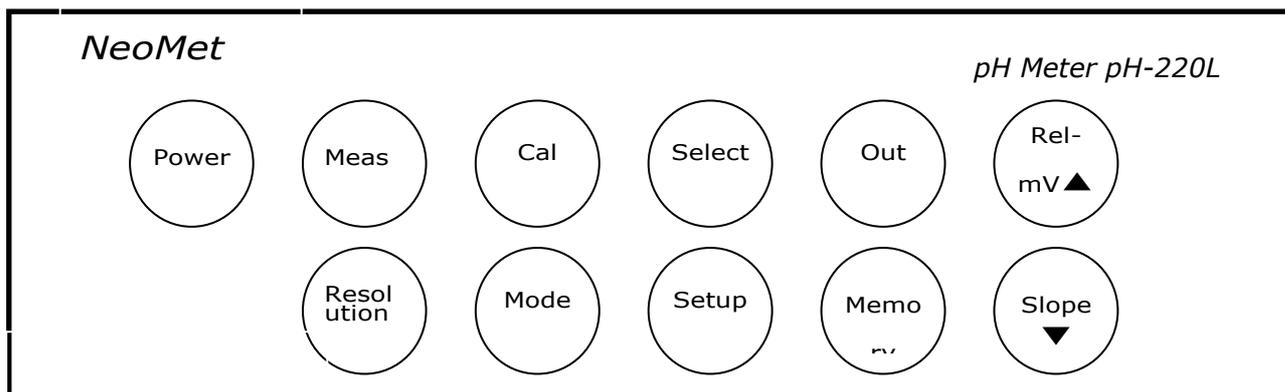


Key Description

Key	Functions
Power	used to turn ON/OFF.
Meas	used to change condition of meter, i.e. measure or ready. This is used for changing from ready to measure condition or reversing.
Cal	used to start and set calibration. In addition, exit in the middle of calibration.
Resolution	used to convert of the precision of the data which is displayed Data's precision on the pH is 0.001/0.01/0.1
Setup	used to access the setup menu. This is used for setting instrument operating parameter for example, regulation of temperature or setting time.
Mode	used to change operating modes, such as pH or mV.
Memory	used to store data in meter memory while measuring. In the ready condition, used to search for the memorized data. Used to escape from Memory(Data Mode)
Out	used to print display data, or in setup mode used to exit.
Rel-mV(▲)	In measuring mV, present value is displayed "0" on the screen. In case of a manual calibration, press this to increase value of data.
Slope(▼)	Displays slope after pH calibration. In case of a manual calibration, press this to decrease data's value

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■ pH-220L (pH/mV/ORP/TEMP Meter)

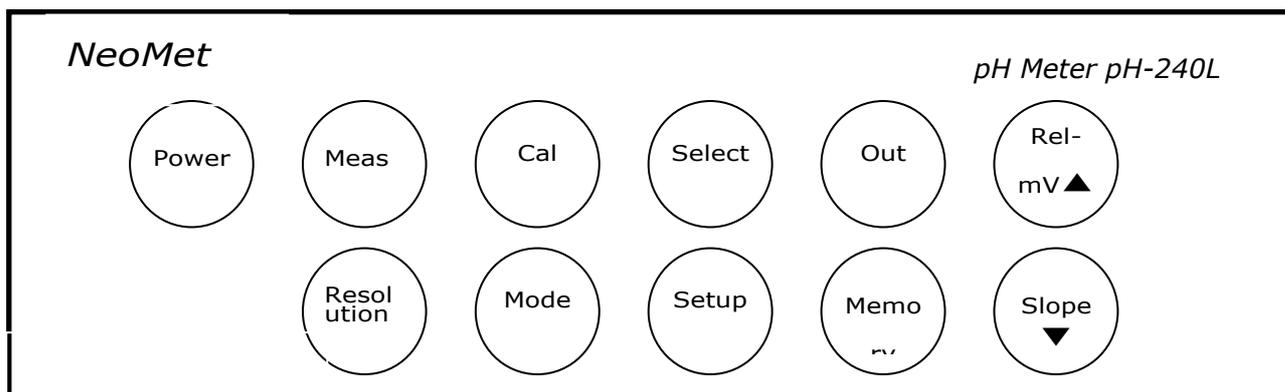


Key Description

Key	Functions
Power	used to turn ON/OFF.
Meas	used to change condition of meter, i.e. measure or ready. This is used for changing from ready to measure condition or reversing.
Cal	used to start and set calibration. In addition, exit in the middle of calibration.
Resolution	used to convert of the precision of the data which is displayed Data's precision on the pH is 0.001/0.01/0.1
Setup	used to access the setup menu. This is used for setting instrument operating parameter for example, regulation of temperature or setting time.
Mode	used to change operating modes, such as pH or mV or ORP
Memory	used to store data in meter memory while measuring. In the ready condition, used to search for the memorized data. Used to escape from Memory(Data Mode)
Out	used to print display data, or in setup mode used to exit.
Rel-mV(▲)	In measuring mV, present value is displayed "0" on the screen. In case of a manual calibration, press this to increase value of data.
Slope(▼)	Displays slope after pH calibration. In case of a manual calibration, press this to decrease data's value

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■ pH-240L (pH/mV/ORP/ISE/TEMP Meter)



Key Description

Key	Functions
Power	used to turn ON/OFF.
Meas	used to change condition of meter, i.e. measure or ready. This is used for changing from ready to measure condition or reversing.
Cal	used to start and set calibration. In addition, exit in the middle of calibration.
Resolution	used to convert of the precision of the data which is displayed Data's precision on the pH is 0.001/0.01/0.1
Setup	used to access the setup menu. This is used for setting instrument operating parameter for example, regulation of temperature or setting time.
Mode	used to change operating modes, such as pH or mV or ISE
Memory	used to store data in meter memory while measuring. In the ready condition, used to search for the memorized data. Used to escape from Memory(Data Mode)
Out	used to print display data, or in setup mode used to exit.
Rel-mV(▲)	In measuring mV, present value is displayed "0" on the screen. In case of a manual calibration, press this to increase value of data.
Slope(▼)	Displays slope after pH calibration. In case of a manual calibration, press this to decrease data's value

Laboratory pH Meter(Model No. pH-200L,pH-220L,pH-240L

3) Display Description

The following display is specially specified.

■ pH-200L



■ pH-220L



■ pH-240L

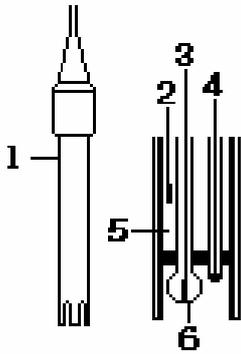


Display	Functions
pH	displayed power of hydrogen with range of -2.000 to 19.999 pH.
ATC (°C)	displayed when a temperature probe is attached, and indicates automatic temperature compensation.
Measure	indicates that meter is in measurement mode. If this is not shown, indicates ready condition.
Ready	indicates that meter is in ready mode.
Stable	When the data is stabled, It shows the upper portion of the screen
CAL	indicates that meter is in calibration condition.
Cal- OK	indicates the end of calibration corresponding to number.
Slope	after doing calibration of pH or ISE, indicates slope value. It is displayed in the left field.
Error	displayed when it is not available to correctly measure because something is wrong in the meter or buffer while calibrating or measuring.
ISE(mg/L)	displayed each kinds of Ion It's consistency is marked 0~ 19999mg/L, and in case of The value is higher then this range, it is marked multiplier of 10 (It's come under pH-240L only)

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Electrode Structure

General pH Combination Electrode



1. Reference Filling Hole ; hole filling electrode with the filling solution
2. Ag/AgCl or calomel electrode ; Reference Electrode
3. pH mono electrode ; indicator electrode
4. Temperature sensor
5. Reference Filling Solution ; Saturated KCl Solution
6. Glass Membrane ; membrane selectively responding hydrogen ion

Electrode Storage and Maintenance

Electrode Storage

Membrane must be kept wet. If there is no storage solution, pH 4 buffer is best for the single glass electrode and saturated KCl is preferred for a calomel and Ag/AgCl reference electrode. Saturated KCl is the preferred solution for a combination electrode. Electrodes are sometimes stored in distilled water, but this method causes electrode life to decrease. Electrodes are stored in the cap storage solution supplied by istek.

Electrode Maintenance (Electrode Cleaning)

If it takes long time to response or a stable data isn't obtained, can often be restored to normal performance by one of the following procedures;

Glass electrodes fail because of scratches, deterioration or accumulation of debris on the glass surface.

- Salt deposits

Recover electrode by alternately immersing it three times each in 0.1N HCl and 0.1N NaOH for approx. five minutes. If this fails, immerse tip in KCl solution for 30s. After recovery, soak in pH 7.00 buffer overnight. Rinse and soak in pH 7.00 buffer. Rinse again with distilled water before use.

- Oil/Grease films

Remove oil/Grease films with detergent, and then rinse electrode with distilled water.

- Clogged Reference Junction

Heat diluted KCl solution to about 60 ~ 80 °C. The electrode must be stored in this solution for approx. ten minutes, then cool electrode in not heated KCl solution.

- Protein removal

Protein coatings can be removed by soaking glass electrodes in a 10% pepsin solution adjusted to pH 1 to 2.

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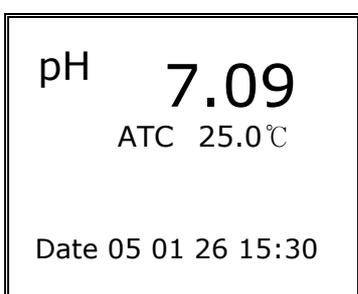
Chapter III. Setup Functions

1) Setup in pH mode

Data -Logging (To operate Hyper- terminal)

※ If you would like to receive a data from a meter directly in real-time, connect the Meter to Computer by using RS232C interface cable. With this cable, you can receive the measured value. Interval also can be regulated by user, Minimum interval will be 1 second.

When you turn on the Meter, below is displayed. After pressing [Setup] key, select ON/OFF of data transmitting by using [▲] or [▼] key



Press [Out] Key to exit initial display.

Temperature Setting

※ Temperature which is settled differs with real temperature, you can set correct temp manually. From the pH initial display, press [Setup] Key by three times to enter Temp setup display as follow picture.

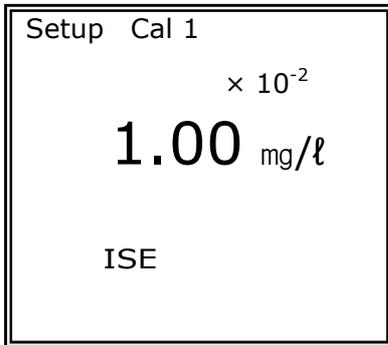
From this display, you can set a correct temp by using [▲], [▼] key. If finishing setup, press [Setup] Key or [Out] key to exit to the initial display.



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2) Setup in ISE mode (pH-240L only)

In pH Mode, press [Mode] key twice to convert ISE mode.



From ISE Ready Mode, press [Setup] key to enter in left display. And press [Select] key to find proper standard solution 1.00×10^{-2} , 1.00×10^0 , 1.00×10^1 , 1.00×10^2 , 1.00×10^3 . And press [Memory] key to selecting standard solution what is displayed.

It is available to select Max 5 Points of standard solution. But generally, they select 2 points of solutions for calibration. If it is finished set up, press [Out] key to exit from setup mode.

Memory Clear (Delete Memory)

If you would like to delete whole stored data then make Memory Clear as a follow.

Press [Mode] key to go mV mode and then press [Select] key to delete the whole former data which were saved. When the Memory Clear is finished, display comes back to pH initial display.

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Chapter IV. Calibration and Measurement

1. pH Calibration and Measurement

There are two ways to calibrate

- 1) Auto calibration
- 2) Manual calibration

It is not allowed to calibrate only 1 point. (Min. 2 Points calibration should be made) If user tried to exit after 1 point calibration, it is appeared "error message ("Err")" Thus put in the sensor to next buffer and press [Meas] key to second calibration.

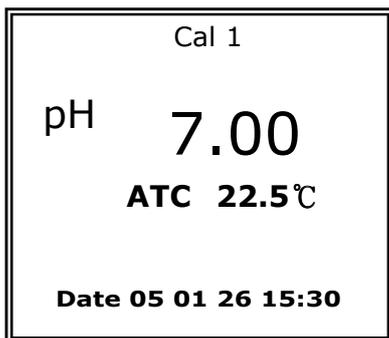
1) Preparation

Turn on the power
Connect meter with electrode and ATC.
Prepare calibration buffers and magnetic stirrer.

2) Calibration (Auto / Manual)

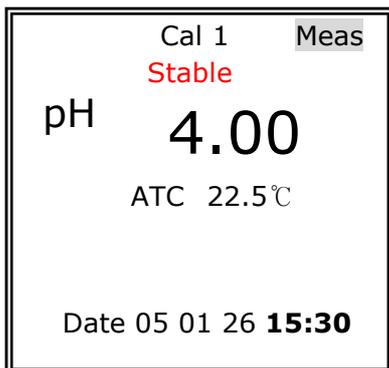
2-1) Auto calibration

1) Calibration of CAL1 (Setting Buffer 1)



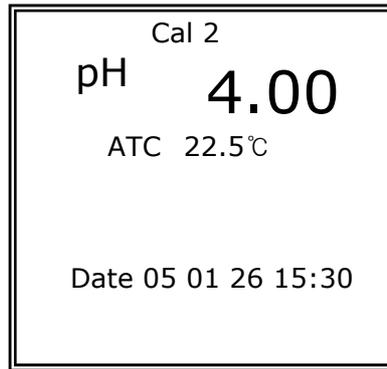
From pH ready, press [Cal] Key to move Cal 1 then left display is shown.

Rinse the sensor with distilled water carefully and put it in first buffer (pH 4.00) and stir it carefully for a while and press [Meas] Key.

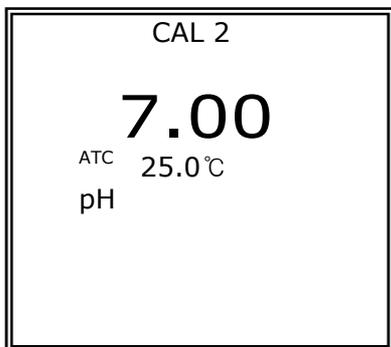


When Meas is appeared on the top portion of the display and Calibration buffer's pH vale is also indicated. From this display, when 'Stable Data' is appeared, press [Cal] Key. Then "Cal 1 OK" message is appeared on the top row of the screen. This is the end of first buffer's calibration.

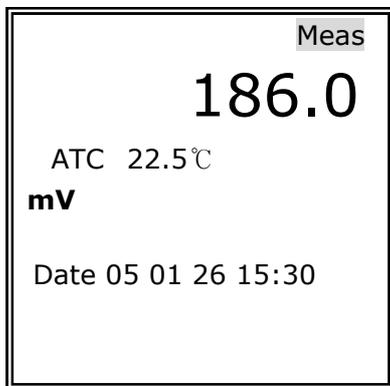
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After this first buffer's calibration, it is passed to Cal 2 display automatically. The left figure indicates the end of CAL1 calibration. Then "CAL 2" message is displayed in the upper field.



2) Calibration of CAL2 to CAL3 (Buffer2 to Buffer3)
Calibration method of Cal2 to cal3 is same with cal 1. When you finished 3points, it is exit to pH initial display. Rinse the sensor with distilled water and put it into the Second Buffer for next calibration.



While it is measuring, you are able to know millivolt by pressing [**Mode**] key

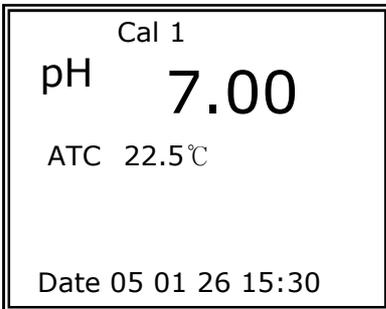
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2-2) Manual Calibration

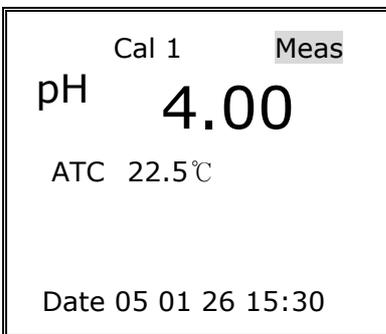
If you would like to calibrate with other buffers excluding 4.00, 7.00 or 10.00, use the manual calibration.

1) Calibration of CAL1(Buffer 1)

In the pH ready condition, press [Cal] key.



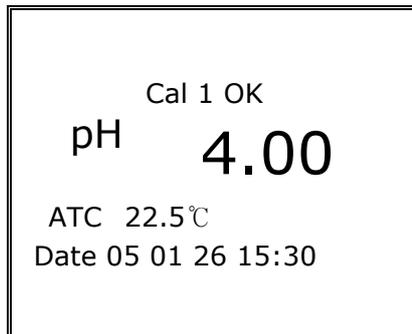
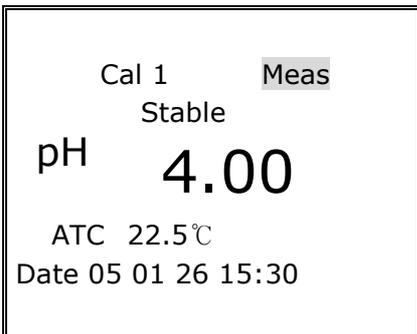
Rinse the pH sensor with distilled water clearly and put it into the first buffer (Buffer 4.00) And stir it constantly (but nit violent), for more accurate measurement.



And press [Meas] Key.

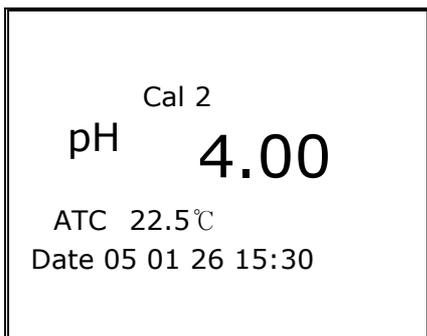
From this display, when 'Stable Data' is appeared, set in the buffer's pH manually by using [^] or [v] key. After that press [Cal] Key then "Cal 1 OK" message is appeared a top row of the screen. When it is stable, it is passed to Cal 2 display automatically

This is display which is indicated the first buffer's calibration is completed.



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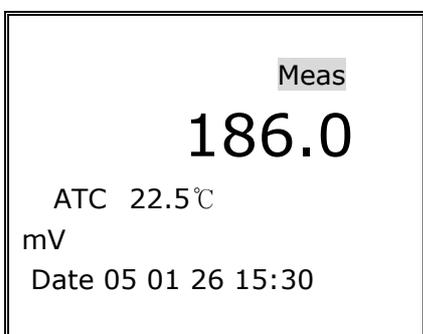
2) Calibration of Cal 2 to Cal 5



Calibration method of Cal2 to Cal 5 is same with cal 1.(For pH-200L, maximum is Cal 3 ,But pH-220, pH-240 it can be calibrated until 5 points maximum)

When you press [Cal] Key after 2 or 3 points calibration, it is exit to pH initial display.
When you finished calibration, put the sensor into the sample and press [Meas] Key.

While it is measuring, you are able to find millivolt value(mV) by pressing [Mode] key.



2. ISE Calibration and Measurement (For pH-240L only)

1) Preparation

For calibrating ION electrode, a preparation is as a follows.

a) ION Meter

b) Proper ION sensor (According as a preparation progress which was written in ION sensor's Manual, sink the sensor in the standard solution for 30 minute to 2 hours. Shake the sensor, you should remove the airdrops on surface of the Membrane.)

c) Ion Standard Solution (Generally 100ppm, 1000ppm)

d) ION ISA Solution

e) Stirrer, Magnetic Bar, 100ml Beaker, Pipette etc.

Temp of sample should be same with standard buffer solution's temp. 1°C difference between the sample and standard solution brings about 2% errors.

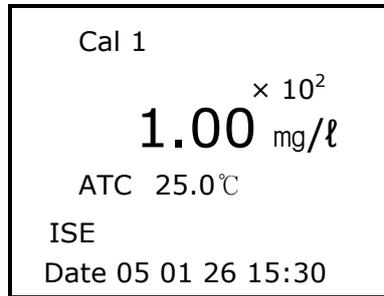
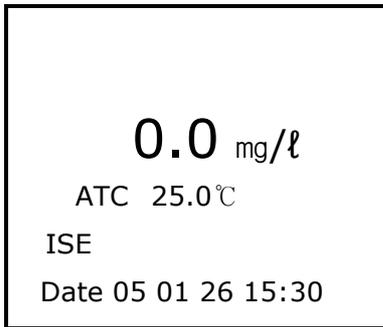
After finishing, drop ISA solution for removing Interferences in the sample (The ratio is 100% (sample) to 2% (ISA solution)) to the 2 kinds of standard solutions (100ppm, 1000ppm) and the sample. In the case of ION calibration & measuring, careful rinsing and stirrer of the sensor is surely essential.

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2) ION Calibration and Measurement

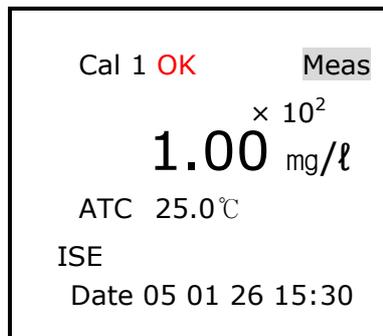
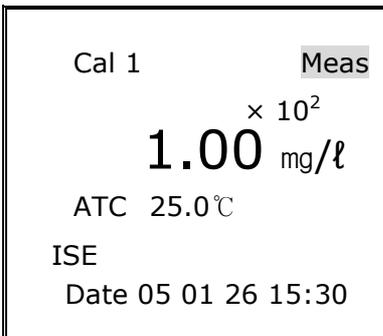
2-1) Calibration of CAL 1 (Buffer 1)

In ISE ready, press [Cal] key, below is displayed.



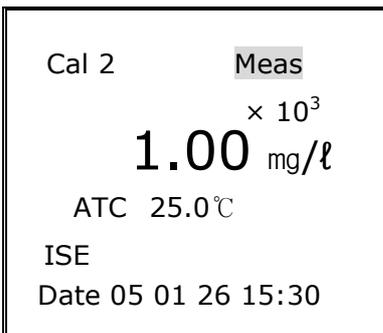
At first, rinse the sensor with distilled water carefully, remove moisture clearly and put in the electrode into first calibration Buffer<Cal 1> and stir it carefully for a while and press [Meas] Key, then Meas is appeared on the screen and Calibration buffer's ION vale is also indicated.

When the ISE (mg/L)'s value is stable, press [Cal] Key to complete calibration.

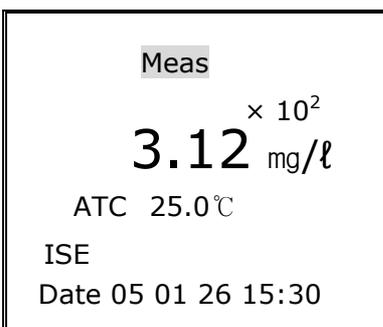


Right one is indicated of finishing of the first buffer's calibration

2-2) Calibration of Cal 2 to



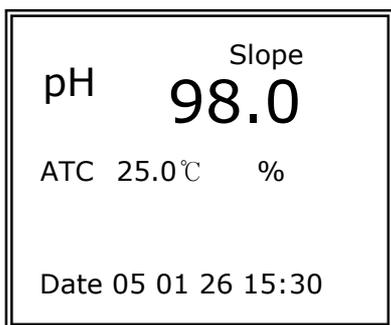
Calibration of Cal 2 and Cal 5 has same way as Cal 1. Press [Cal] Key again, then you can get out ISE initial display after 2 or 3 points calibration.



After finishing the calibration, It displayed accurate data when you put the sensor in the sample and press [Meas] Key.

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3. Slope Feature & Functions



If you would like to know electrode's slope value after pH calibration, press [Slope] key. The slope value is displayed in the main field of screen and disappeared.

For the correct operation, the range of slope must be within 80 ~ 120%. If the slope is not within this range, prefer newly calibrating in order to prevent the higher error.

It also makes to estimate time of exchange of electrode since can know error through slope.

4. Millivolt and Relative Millivolt Measurement

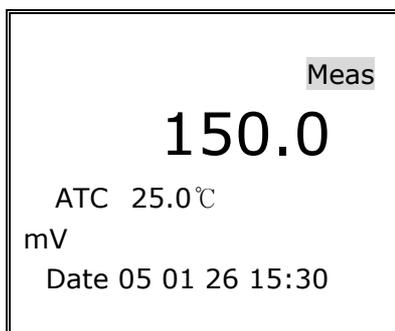
Meter can measure absolute or relative millivolt. This relative millivolt value will be needed when performing potentiometric titration or preparing calibration curves. Relative Millivolt is displayed to 0.1mV resolution in the range of -1999.9 to +1999.9 mV

Millivolt Measurement

Press [Mode] key to go mV Mode and press [Meas] Key

Millivolt is displayed to 0.1mV resolution in the range of -1999.9 to +1999.9 mV

Below is display of measuring mV value



So it is available to measure mV value for pH or ION when they are measuring

Relative Millivolt Measurement

This relative millivolt value will be needed when performing potentiometric titration or preparing calibration curves. Relative Millivolt is displayed to 0.1mV resolution in the range of -1999.9 to +1999.9 mV.

In the measuring condition of mV, changed from a currently displayed value to 0 value by pressing Rel-mV key and then measures relative millivolt.

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Chapter V. Data-Log

It is available to receive the measured data by using RS232C Communications equipment (Hyper Terminal) or PC.

In Ready Condition, connect the pH Meter to the computer with RS232C communication cable and install the communication Program in your PC.

After that , press [Meas] Key of the Meter and you can get the data from the Meters.

Min interval of this 1 sec. (Item, Data, Temp and Time)

pH 7.09	25.0	05/06/13	01:26
pH 7.09	25.0	05/06/13	01:26
pH 7.09	25.0	05/06/13	01:26
pH 7.09	25.0	05/06/13	01:26
pH 7.09	25.0	05/06/13	01:26

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Chapter VII Troubleshooting & Error Description

MALFUNCTION	POSSIBLE CAUSE	REMEDY
No display	No power to meter	Press Power key.
		Check that the adaptor is correctly plugged.
Error occurred in Cal mode - Reading Out of Range	Electrode failure Out of Range for Buffer	Check that meter is correctly connected with electrode and ATC probe.
	When trying to exit after calibrating only 1 point, error message (Err) appears.	Press Reset key or continue calibration.
Error occurred in measure mode	Out of measuring range of pH	Check that meter is correctly connected with electrode and ATC probe.
		Check Calibration Slope

If you failed to find the cause of errors,

- Please do **Memory Clear** (Refer Setup Function Part for getting further information)
- The problem still persists, please **contact istek, Inc Product Service Department.**
(Tel : 82-2-2108-8400, E-mail : istek@istek.co.kr, Contact Person, Mr. S. H Park)

Laboratory pH Meter(Model No. pH-200L,pH-220L,pH-240L

Chapter VIII. Specifications

Model		pH-200L	pH-220L	pH-240L
pH	Range Resolution Relative Accuracy	-2.00 to 19.01 ±0.02	-2.000 to 19.999 0.001/0.01/0.1 ±0.002	-2.000 to 19.999 0.001/0.01/0.1 ±0.002
Millivolt (ORP)	Range Resolution Relative Accuracy	±1999.9 mV 0.1 mV ±0.1 mV	±1999.9 mV 0.1 mV ±0.1 mV	±1999.9 mV 0.1 mV ±0.1 mV
Concentration (ISE)	Range Resolution Relative Accuracy	×	×	0.00001 to 19999 ± one least significant ±0.25% of reading
Temperature	Range Resolution Relative Accuracy	-10 to 110℃ 0.1℃ ±0.4℃	-10 to 110℃ 0.1℃ ±0.4℃	-10 to 110℃ 0.1℃ ±0.4℃
pH Calibration		Auto/Manual (3points)	Auto(3points) / Manual (5points)	
Data Logging		100 Points	100 Points	100 Points
Slope		80 ~ 120%		
Temperature Compensation		Auto		
Calibration		Auto		
Input		BNC , ATC , Power, RS232C		
Output		RS232C (Computer/Printer)		
Power		AC/DC Power Adaptor		
Standard Accessories		Combination pH Electrode/ ATC Probe, AC/DC Adaptor, Instruction Manual, Buffer Solution (125ml), Stand		
Optional Accessories		ORP, Ion electrode pH Storage, Filling Solution, RS232C Cable, Printer		

Laboratory pH Meter(Model No. pH-200L,pH-220L,pH-240L)

* ISE Specifications (For PH-240L Only)

ISE	Sensing Type	Measurement Range		Slope	pH Range	Temp(°C) Range	Response Time	Reference Electrode & Filling solution
		Molar(M)	mg/L(ppm)					
NH ₃	GS	1.0~5×10 ⁻⁷	17,000~0.01	56±3	above11	0~50	20	N/A,NH ₄ Cl
NH ₄ ⁺	PM	1.0~5×10 ⁻⁶	18,000~0.1	56±2	4~10	0~50	30	Dbl,NaCl
Br ⁻	SSM	1.0~5×10 ⁻⁶	79,900~0.4	57±2	0~14	0~80	20	Dbl,KNO ₃
Cd ⁺²	SSM	0.1~1×10 ⁻⁷	11,200~0.01	27±2	2~12	0~80	20	Dbl,KNO ₃
Ca ⁺²	PM	1.0~5×10 ⁻⁶	40,000~0.2	27±2	3~10	0~50	30	Sgl,KCl
CO ₂	GS	0.01~1×10 ⁻⁴	440~4.4	56±3	4.8~5.2	0~50	20	N/A,NaHCO ₃
Cl ⁻	SSM	1.0~5×10 ⁻⁵	35,500~1.8	56±2	2~12	0~80	20	Dbl,KNO ₃
Cu ⁺²	SSM	0.1~1×10 ⁻⁸	6,350~0.0006	27±2	2~12	0~80	20	Dbl,KNO ₃
CN ⁻	SSM	0.01~5×10 ⁻⁶	260~0.1	57±2	11~13	0~80	20	Dbl,KNO ₃
F ⁻	SSM	Sat'd~1×10 ⁻⁶	Sat'd~0.02	57±2	5~8	0~80	20	Sgl,KCl
BF ₄ ⁻	PM	1.0~7×10 ⁻⁶	10,8,00~0.1(B)	56±2	2.5~11	0~50	30	Dbl,(NH ₄) ₂ SO ₄
I ⁻	SSM	1.0~5×10 ⁻⁸	127,000~0.006	57±2	0~14	0~80	20	Dbl,KNO ₃
Pb ⁺²	SSM	0.1~1×10 ⁻⁶	20,700~0.2	25±2	3~8	0~80	20	Dbl,KNO ₃
Li ⁺	PM	1.0~1×10 ⁻⁵	6,900~0.7	56±2	5~10	0~50	30	Dbl,(NH ₄) ₂ SO ₄
NO ₃ ⁻	PM	1.0~7×10 ⁻⁶	62,000~0.5	56±2	2.5~11	0~50	30	Dbl,(NH ₄) ₂ SO ₄
NO _x	GS	5×10 ⁻³ ~5×10 ⁻⁶	220~0.2	56±3	1.1~1.7	0~50	30	N/A,NaNO ₃
ClO ₄ ⁻	PM	1.0~7×10 ⁻⁶	98,000~0.7	56±2	2.5~11	0~50	30	Dbl,(NH ₄) ₂ SO ₄
K ⁺	PM	1.0~1×10 ⁻⁶	39,000~0.04	56±2	2~12	0~50	30	Dbl,NaCl
Ag ⁺ / S ⁻²	SSM	1.0~1×10 ⁻⁷	107,900~0.01	57±2	2~12	0~80	20	Dbl,KNO ₃
		1.0~1×10 ⁻⁷	32,100~0.003	27±2	2~12	0~80	20	Dbl,KNO ₃
Na ⁺	PM	1.0~1×10 ⁻⁵	23,000~0.2	55±2	5~10	0~50	30	Dbl,NH ₄ Cl
X ⁺ /X ⁻	SSM	5×10 ⁻² ~1×10 ⁻⁶	12,000~1.0	Titration	2~12	0~50	30	Sgl,KCL
Ca ⁺² / Mg ⁺²	PM	1.0~1×10 ⁻⁵	40,000~0.4(Ca)	26±3	5~10	0~50	30	Sgl,KCl

* Sensing Type ; GS(Gas Sensing), PM(Polymer Membrane)
SSM(Solid State Membrane)

* Response Time ; Indicates response time.

* Reference electrode ; N/A (No Reference Electrode),
Dbl (Double Junction Reference Electrode),
Sgl (Single Junction Reference Electrode)

Laboratory pH Meter(Model No. pH-200L,pH-220L,pH-240L

Chapter IX. Ordering Information

For getting further information about accessories, please feel free to contact istek, Inc.

A. Standard

- * Combination pH Electrode/ATC Probe
- * AC/DC Power Adaptor
- * Buffer Solutions (pH4.00, 7.00, 10.00) 125ml
- * Instruction Manual

B. Option

- * pH, ORP, ION Electrode Set
- * Luxury Third-Arm Stand
- * Electrode Storage Solution 475ml
- * Electrode Filling Solution 125ml
- * Buffer Solutions (pH4.00, 7.00, 10.00) 475ml
- * RS232C Interface Cable

istek, Inc.

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Homepage : <http://www.istek.co.kr>

E-mail : istek@istek.co.kr



Laboratory pH Meter(Model No. pH-200L,pH-220L,pH-240L



Kuro-ku, Seoul, Korea

Room 1011, Hanshin IT-Tower #235, Kuro-Dong,

Tel : +82-2-2108-8400 Fax : +82-2-2108-8430
URL : http://www.istek.co.kr E-mail : istek@istek.co.kr

CERTIFICATE OF WARRANTY

* We guarantee as following,

1. This product has been passed our strict inspection process.
(It comes under the meters with the exception of an electrode)
2. Defects occurring within 2years from delivery date shall be remedied free of charge at our works when it has been used in a normal situation. (But we can make a user pay for mending charge in the case of trouble caused by a careless user.)
3. We will repair the good with fee about problems caused by user's mistake even if warranty period has not been over.
4. Please present this form with the good when you want to repair it.
5. Please keep this certificate with care because this sheet will not be reissued.

Product name		Warranty period
Model name		2 years
Serial number		
Manufacturing month/year		

Date. . . , 2006
Authorized signature