



Instruction Manual
for
No. 6410-00 Pen Type pH meter
Model SK-610PH-II

SATO KEIRYOKI MFG. CO., LTD.

Introduction

Thank you for purchasing the Pen Type pH meter Model SK-610PH-II.

- This pH meter is designed to measure hydrogen ion concentration (pH) and temperature (liquid temperature). Do not use this instrument for any other purposes.
- Read this instruction manual thoroughly before using the SK-610PH-II and keep it in a safe place for your future references.



Important Safety Instructions

The SK-610PH-II is not explosion-proof. Never use it for flammable materials.



DANGER RISK OF EXPLOSION

- Do not use the pH standard solutions for any purposes other than for calibration. The solutions are not for drinking. Never try to drink them. If accidentally ingested, consult a medical help immediately.
(The pH standard solutions are optional items, not included as standard accessories.)
- For any other inquiries, contact the store where you purchased the instrument or our service network.



Cautions

For proper usage of the instrument, make sure the following points:

- This is a precision instrument. Be careful not to drop or knock it.
- Operating this instrument outside the temperature range may result in unit malfunctions. Make sure to use the unit within the operating temperature range specified in this manual.
- Do not use the unit in water.
- Avoid using this unit in a place exposed to direct sunlight or near a heat source. Otherwise, the case may become deformed or malfunction may be caused.
- If this instrument is left in a car under the hot summer sun, it will become extremely hot and may malfunction. Do not leave the unit in such a place.
- If this unit is used in an environment where electrical noise is generated, the display may become unstable or the measurement error may increase.
- Never disassemble or modify the unit. Doing so may cause malfunctions.
- If the unit will not be used for a long period of time, always remove the battery. Otherwise, the battery power may be wasted and the battery fluid may leak, resulting in malfunctions.
- Do not dispose of used batteries in fire.
- Keep the batteries out of reach of children. If swallowed accidentally, consult a medical attention immediately.
- For environmental protection, dispose of used battery in compliance with local rules and regulations.
- Do not clean this unit with alcohol, thinner, or other solvents. If the unit becomes dirty, wipe it with a tightly wrung towel or the like that has been dipped in warm water with a neutral detergent.
- The sensor probe electrode of this unit may be damaged or its useful life may be shortened if it is used for

liquids such as organic solvents, oils, adhesives, strong acids (pH 0 to pH 2), strong alkalis (pH 12 to pH 14) and surface-active agents.

- The pH reading may become unstable when measuring pure water.
- If the pH standard solution contacts the skin (hand), immediately wash the contaminated skin with running water. If the solution gets into the eyes, rinse immediately with water and consult a medical attention.
- Keep the pH standard solutions out of reach of children. If accidentally ingested, consult a medical attention immediately.

Overview

The SK-610PH-IIpH meter is easy-to-operate instrument for measuring hydrogen ion concentration (pH) and liquid temperature.

The meter can be calibrated at three pH levels (pH 4, pH 7 and pH 10) and provides reliable measurements by using the built-in automatic pH measurement temperature compensation.

Note: The pH standard solutions are optional items, not included as standard accessories.

Features

- **Easy-to-use pen type**

With its easy-to-hold shape of the body, it is possible to monitor the reading while taking a measurement. The design of the body is officially licensed. (Registration No. 1130099)

- **Auto Power-Off**

The "auto power-off" function turns off the unit if any operation has not been taken for 20 minutes to conserve battery life.

- **Auto temperature compensation**

The SK-610PH-II performs automatic temperature compensation to produce more accurate pH measurements.

- **Waterproof**

In compliance with the IPX4 grade (JIS C 0920): Water splashed against the enclosure from any direction shall have no harmful effects.

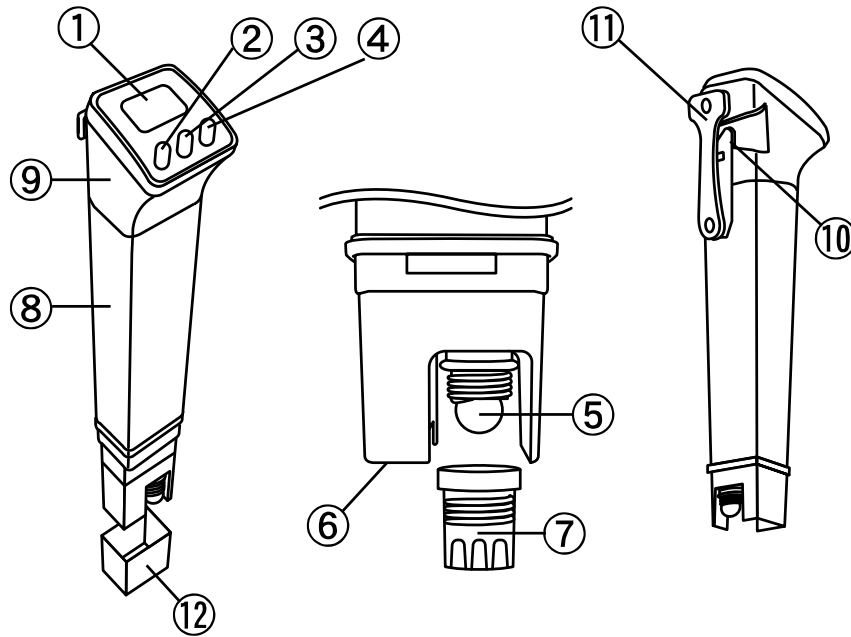
- **Replaceable glass electrode**



Cautions before use

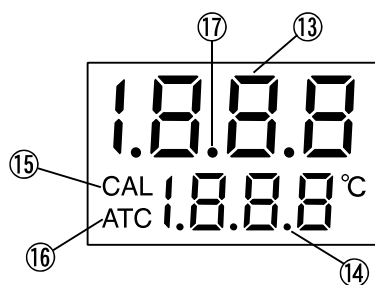
- Check that the instrument has not been damaged during transport. If damage is found, contact the store where you purchased the instrument or our service network.
- When the pH of food or drink is to be measured, take a sample (sufficient quantity so that the sensor tip can be immersed at least 3 cm in the sample) in a separate container for measurement. Do not ingest the sample after measurement.
- The sensor section is made of glass, so take a great care in handling.
If it is damaged, be careful not to get injured by broken glass.
If the liquid inside comes in contact with your skin, rinse immediately with water.
- The glass electrode is a consumable. It needs to be replaced with a new one if the electrode is broken or the performance is degraded. (The glass electrode is not repairable.)

Components names and functions



- (1) LCD : Displays measurement readings or status of the unit.
- (2) **ⓘ** key (power key) : Press this key to turn on the unit. To turn off the unit, press the key again.
- (3) CAL key : Enters the calibration mode.
- (4) HLD key : Holds the value being displayed. Increments the pH value to be adjusted in calibration mode.
- (5) Glass electrode : Measures pH value.
- (6) Temperature sensor : Measures temperature.
- (7) Glass electrode cover : Protection cover. Fasten the cover by turning.
- (8) Lower part of the body : The glass electrode and temperature sensors are inside.
- (9) Upper part of the body : Display area
- (10) Fixture : This connects the upper and lower parts of the body.
- (11) Clip for installation : Use this to fasten the unit.
- (12) Sensor cap

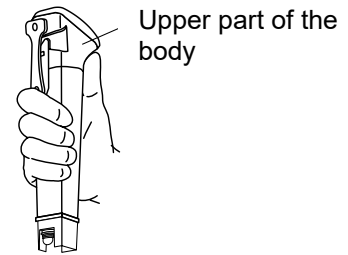
● **LCD**



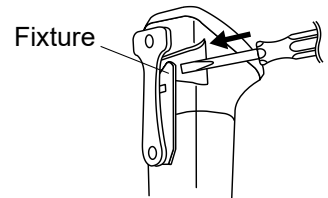
- (13) pH reading
- (14) Temperature reading
- (15) CAL: Lights in Calibration mode
- (16) ATC: Auto Temperature Compensation
- (17) Mode Discrimination:
Blinks as decimal point and lights when the measured value is held. In calibration mode, this switch to lighting

Installing and replacing battery

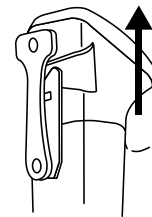
(1) Take the unit in your hands as shown on the illustration on the right.



(2) Insert the tip of a Phillips screwdriver under the fixture part and release from the upper part of the body.



(3) Push up the upper part of the body with your thumb to open the battery compartment.



(4) Take out the exhausted batteries.

(5) Install new batteries with the '+' mark facing up. Note: Always use brand new batteries to avoid malfunctions and leak of battery fluid.

(6) Reinstall the upper part of the body and fasten the fixture.



Cautions

- The batteries are factory preset and since those batteries are for monitoring purposes, they may not last as long as general batteries.
- When the LCD blinks, replace new batteries. If you continue to use the unit with its LCD blinking, malfunctions can occur.
- For waterproof purpose, the fixture which connects upper and lower parts of the body is fastened very tight. Be careful not to hurt yourself by using your fingernails to unfasten.
- Always fasten the upper part of the body tightly onto the lower part for waterproof reason. Also be careful not to have any dust on the connecting area. If it is dirty, clean well before fastening.
- Do not let the unit get wet when the body is disconnected. If water gets inside the unit, the instrument might get damaged.
- The fixture for the upper and lower parts of the body is not rotatable. If you force to rotate the fixture, it could damage both the fixture and the body.

Before Measuring

There is phthalate solution inside the cover avoiding the glass electrodes becomes dry. Be careful not to spill when removing. After the measurement, put the cover on the glass electrodes


NB: When the unit is used for the first time or after it has been stored for several days, the pH measurement response may be slower. In such cases, immerse the sensor probe electrode in either the pH standard solution or water and let it stand for one hour. For more accurate measurement, immerse it 12 hours at



Caution

If the pH standard solution contacts the skin (hand), immediately wash the contaminated skin with running water. If the solution gets into the eyes, rinse immediately with water and consult a medical attention.

Auto Power-Off Function

When the unit is untouched for about 20 minutes, the auto power-off function is triggered. If you need a continuous measurement, make sure to disable the function. To release the Auto Power-off function, press the  key while pressing on the HLD key. When “n” character appears on the LCD, release the HLD key.



Caution

The auto power-off function returns to be active once the unit is turned off. Perform the disable procedure each time as necessary.

Calibration mode

By performing the 3-point calibration, this instrument can accurately measure the pH values. For more accurate measurement, calibration of about once a day is recommended.

It is recommendable to perform the pH calibration after replacing the sensor electrode and after replacing the batteries.

Before calibration, prepare the following items:

- pH 4 standard solution (phthalate solution): pH 4.01 (at 25°C)
- pH 7 standard solution (neutral phosphate solution): pH 6.86 (at 25°C)
- pH 10 standard solution (carbonate solution): pH 10.01 (at 25°C)
- Distilled water, pure water or tap water
- Beakers (each beaker to contain one type of standard solution and water (distilled, pure or tap water))

These standard solutions are separately purchased. Contact with the shop you purchased the SK-610PH-II or our service network

● **How to calibrate the SK-610PH-II pH meter**

To ensure accuracy, perform calibration at the same temperature as the material to be measured.

N.B. For the relation between the pH value of standard solution and the temperature, refer to the section

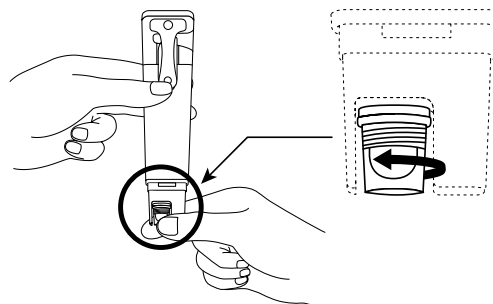
"Relation between pH value and temperature".

- (1) Press the **ⓘ** key to turn on.
- (2) Remove the sensor cap and glass electrode cover.

- **How to remove the glass electrode cover**

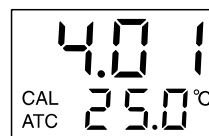
With the back of the unit facing you, place your fingers on the cover from sideways and turn it counterclockwise.

Note: There is phthalate solution inside the cover. Be careful not to spill when removing.



- (3) Wash the glass electrode thoroughly with water (distilled, pure or tap water) and wipe clean the water on the glass electrode
- (4) Press the CAL key to enter the calibration mode. Check that [3.80] is displayed on the LCD and "CAL" character appears on the display.

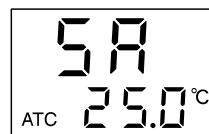
- (5) Press the HLD key to set the pH calibration value to "4.01" (when immersed in phthalate solution in at 25°C.)



Immerse the glass electrode into the pH 4 standard solution. Slowly stir the solution with the electrode, and then hold the unit still. When the standard solution is in, "CAL" character starts to blink.



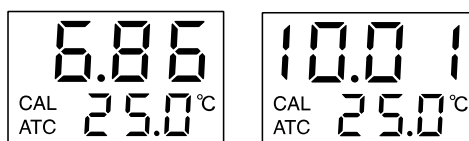
- (6) After one minute since the "CAL" indication started to blink or since setting the calibration value, the "SA" indication appears on the display to indicate the set value has been stored in the unit memory.



- (7) The unit automatically proceeds to the pH 7 calibration. Wash the glass electrode with water (distilled, pure or tap water).

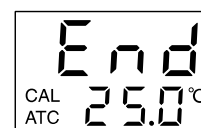
Note: After washing, use clean filter paper, cotton swabs or tissue paper to absorb the water off the glass electrode. Be careful not to damage the glass electrode by rubbing too hard.

- (8) Perform calibration on pH 7 and pH 10 by using the same procedure as for pH 4



- The figure above shows the case when the pH 7 standard solution is 25.0°.
- The figure above shows the case when the pH 10 standard solution is 25.0°
- Every data for each pH calibration must be stored in the unit memory.

- (9) When the pH 10 calibration is complete, "End" is displayed on the LCD.





Cautions

- The “CAL” indication does not appear if the glass electrode is dry or there is a problem with the standard solutions. Refer to “Troubleshooting” for the solution to the problem
- The table below shows the pH value range to be set for calibration.

Calibration point	pH value range
pH 4	3.50 to 4.50
pH 7	6.50 to 7.50
pH 10	9.5 to 10.50

Note that it is not possible to perform calibration using the oxalate standard solution (pH 1.68 at 25°C) or borate standard solution (pH 9.18 at 25°C).

- **Sequences when setting pH values in calibration mode**

pH 4 : 3.80 → 3.81 → 3.82 → ... → 4.50 → 3.50 → 3.51 ...

pH 7 : 6.80 → 6.81 → 6.82 → ... → 7.50 → 6.50 → 6.51 ...

pH 10 : 9.80 → 9.81 → 9.82 → ... → 10.50 → 9.50 → 9.51 ...

Relation between pH value and temperature

When performing calibration, set the pH value according to the temperature of the standard solution as follows;

Standard solution	Name of solution	Temp.	pH value	Temp.	pH value
pH 4	Phthalate solution	0 °C	4.00	30°C	4.02
		5 °C	4.00	35°C	4.02
		10°C	4.00	40°C	4.04
		15°C	4.00	45°C	4.05
		20°C	4.00	50°C	4.06
		25°C	4.01	-	-
pH 7	Neutral phosphate solution	0 °C	6.98	30°C	6.85
		5 °C	6.95	35°C	6.84
		10°C	6.92	40°C	6.84
		15°C	6.90	45°C	6.83
		20°C	6.88	50°C	6.83
		25°C	6.86	-	-
pH 10	Carbonate solution	0 °C	10.32	30°C	9.97
		5 °C	10.24	35°C	9.92
		10°C	10.18	40°C	9.89
		15°C	10.12	45°C	9.86
		20°C	10.06	50°C	9.83
		25°C	10.01	-	-

Measuring procedure

- (1) Press the **ⓘ** key. All digits on the LCD will be lit for one second and the unit enters the measurement mode. (“.” character on the pH value display area will blink.)
- (2) Remove the sensor cap and glass electrode cover.
Note: There is phthalate solution inside the glass electrode cover to prevent the electrode from drying out.
- (3) Immerse the glass electrode at least 3 to 5 cm deep into the material to be measured. The measurement starts when the measured pH value is stable.
- (4) After measurement, press the **ⓘ** key to turn the power off and wash the glass electrode with water (distilled, pure or tap water) before storing.
- (5) Always put the glass electrode cover back on to avoid any possible damages. Also it is important to have the glass electrode dipped in water (distilled, pure or tap water) or in pH standard solution.

About the glass electrode

(1) Storing

If the instrument is unused for a long time, the glass electrode becomes too dry to measure the pH values accurately.

The pH electrode works best and shows accurate readings when used with moderate moisture. When using the instrument for the first time after purchasing or a long storage period, we recommend placing the glass electrode in water (distilled, pure or tap water) or the pH standard solution for at least 12 hours and performing calibration before measuring.

(2) Check and calibration

For an accurate pH measurement, perform calibration using the pH standard solutions.

If there is a deviation from the expected value, adjust it before performing a pH measurement.

Note: In some cases, the pH value of the standard solution changes from its original value. This can happen if the pH standard solution is dirty or if storing the solution for a long time. It is advisable to use a new pH standard solution, where applicable.

(3) Cleaning

Be sure to wash the pH electrode after each pH calibration or measurement with water (distilled, pure or tap water). If left unwashed, the liquid measured tends to form a film on the surface of the electrode, causing measurement errors. Always wash the pH electrode every time after use.

(4) Usable life

The pH electrode is a consumable. Its useful life varies depending on the liquid to be measured, pH value or temperature.

(5) Deposit of white potassium chloride crystals

A deposit of white crystals is sometimes found on the tip of the electrode or protection bottle; this does not pose a problem when using the instrument. The deposit is easily washed off with tap water.

If it does not come off with tap water, soak the electrode in warm water to remove it.

Do not lick or swallow the potassium chloride crystals. If the eyes or skin becomes contaminated with the crystals, immediately consult a medical attention.

Caution: Spare probe model 610S-II is the exclusive probe for SK-610PH-II. Spare probe model 610S cannot be used on this.

Troubleshooting (error codes)

Problem	Possible cause	Action
No power	Batteries have worn out.	Replace with new batteries (Refer to “Installing and replacing batteries”)
The power was turned off automatically.	The auto power-off function is on.	Disable the auto power-off on the main unit. (Refer to “Before measuring”)
Error code — — — (pH display section)	Upper and lower parts of the body are not firmly fastened.	Firmly fasten the upper and lower parts of the body, especially after changing batteries.
	The glass electrode dirty or dry.	Wash the glass electrode of the sensor probe. (Refer to “About the glass electrode”)
	If the problem remains after checking the connection between the main unit and the sensor and after washing the glass electrode, the sample to be measured may be pH 14 or higher.	
‘ATC’ indication does not appear on the LCD.	The upper and lower parts of the body are not securely connected to each other.	Connect the upper and lower parts of the body firmly to each other.
‘CAL’ indication does not blink in calibration process.	The pH value set in the calibration mode and the standard solution pH value are not the same.	Set the same value for the calibration value and the pH standard solution value (Refer to “Calibration mode.”)
	The glass electrode is dirty.	Clean the glass electrode. (Refer to “About the glass electrode.”)
	The glass of the electrode is broken.	Replace the glass electrode with a new one.
Readings are unstable.	The amount of the sample being measured is too small	Immerse the sensor probe at least 3 cm from the tip into the sample solution.
	The sample being measured is pure water with a low electric conductivity.	For stable pH measurement, choose samples with an electric conductivity of approx. 100 $\mu\text{s}/\text{cm}$ or more.
	The temperature of the sample largely fluctuated.	Make the sample temperature stable. The pH values change with temperature.
Readings are abnormal	The measured value is held.	Press the HLD key to release the value.
	The glass electrode is dirty.	Clean the glass electrode. (Refer to “About the glass electrode”)
	The glass electrode surface is dry.	Clean the glass electrode. (Refer to “Storage” in “About the glass electrode.”)
	Calibration has not been performed.	Perform calibration before measurement. (Refer to “Calibration mode.”)
	The amount of the sample being measured is too small	Immerse the sensor probe at least 3 cm from the tip into the sample solution.
	There is a large difference between the temperature of the sample and the calibration temperature.	Set the calibration temperature close to the temperature of the sample. (Best when the temperature difference is within $\pm 3^{\circ}\text{C}$)
The LCD is turned off by itself.	The battery power is low.	Change with new batteries. (Refer to “Installing and replacing batteries.”)

Specifications

Cat. No.	6410-00 Pen type pH meter	
Model	SK-610PH-II	
Measuring factors	Hydrogen ion concentration (pH), Temperature (liquid temp.)	
	pH	Temperature
Measuring Range (Unit and Sensor)	2.00 to 12.00pH	0.0 to 50.0°C
Resolution	0.01pH	0.1°C
Accuracy (Unit and Sensor)	± 0.2 pH (2 to 12pH)	± 0.6°C (at 20 to 30°C) ± 0.8°C (other than above)
Resolution	0.01pH	0.1°C
Elements	Glass electrode	Thermistor
Functions	3-point calibration (pH4.01, pH6.86, pH10.01) Auto power-off function, HOLD function	
Operation ambient	Temperature: 0 to 50°C	
Power requirement	Lithium button battery CR2032 x 2 pcs.	
Battery life	About 20 hours continuous	
Materials	Body : ABS resin Electrode : Glass	
Dimensions	Main unit: (W) 37 × (H) 150 × (D) 42 mm	
Weight	approx. 77 g (including batteries)	
Standard accessories	Lithium button battery CR2032 x 2 pcs., vinyl case	

Options/Consumables

Cat. No.	Remarks
6401-00	Phthalate solution (pH4.01): 500ml (JCSS)
6402-00	Neutral phosphate solution (pH6.86): 500ml (JCSS)
6403-00	Carbonate solution (pH10.01): 500ml (JCSS)
6414-00	Spare electrode model 610S-II

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