HI99181

Portable Waterproof Skin pH Meter



INSTRUCTION MANUAL

HANNA instruments

Dear Customer,

Thank you for choosing a Hanna Instruments product. Please read this instruction manual carefully before using this meter.

This manual will provide you with the necessary information for correct use of this meter, as well as a precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our worldwide contact list at www.hannainst.com.

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PRELIMINARY EXAMINATION

Remove the meter from the packing material and examine it carefully to make sure that no damage has occurred during shipment. If noticeable damage is evident, contact your local Hanna Instruments Office.

Each meter is supplied complete with:

- HI14143/50 pH/temperature probe with flat tip, 50 mm-long body, DIN connector and 1m (3.3') cable
- pH 4.01 & 7.01 Buffer sachets
- HI700620 Cleaning and disinfection solution for skin residual (1 sachet)
- HI700621 Cleaning solution for skin grease and sebum (1 sachet)
- 100 mL beaker (1 pcs.)
- Alkaline batteries: 1.5V AAA (3 pcs.)
- Rugged carrying case
- Calibration certificate of meter
- Calibration certificate of probe
- Instruction manual

Note: Save all packing material until you are sure that the meter functions correctly. All defective items must be returned in the original packing together with the supplied accessories.

GENERAL DESCRIPTION and INTENDED USE

HI99181 is a light weight, portable, pH and temperature meter supplied with a specially designed pH electrode intended for the direct determination of pH on skin and scalp.

Researchers monitoring the compatibility between skin and cosmetics or pharmaceuticals use pH as essential marker of compatibility. The skin mantle has an acidic pH, ranging from pH 4 to 6. The acidic pH is a deterrent toward harmful microbes, pollution, and toxins. Age, genetics, sweat, and moisture can alter the pH of skin. Products are constantly created to restore the pH balance of skin and a reliable pH measurement of skin provides the scientific metrics.

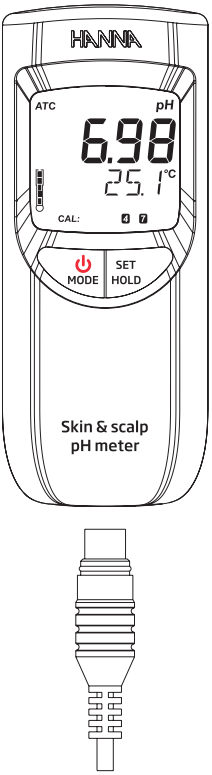
The HI99181 portable pH meter together with a HI14143/50 combination pH electrode (when immersed in a drop of water on the skin surface), can determine the pH of the skin with high accuracy and repeatability.

The HI99181 features two button operation and is simple to use. The HI99181 has a waterproof and compact casing, large dual-line display, and automatic pH calibration at one or two points.

The HI14143/50 offers numerous features that improve pH testing for skin measurements. The flat tip of the HI14143/50 provides optimal contact between the sample and the sensor. The HI14143/50 features low resistance pH glass that responds quickly to the sample. It also has an open junction design and utilizes a non-flowing gelled reference electrolyte so there is no variability in flow rate affecting the measurement. Both the pH sensing surface and reference junction come into intimate contact with the skin and equilibrate quickly and reproducibly. It also has a lower profile for easier handling compared to laboratory sensors; the glass body is just 50 mm in length. The HI14143/50 pH electrode has a built-in temperature sensor for temperature compensated pH and temperature readings and contains an integral pH sensor preamplifier to provide stable measurements in electrically noisy environments.

Main features:

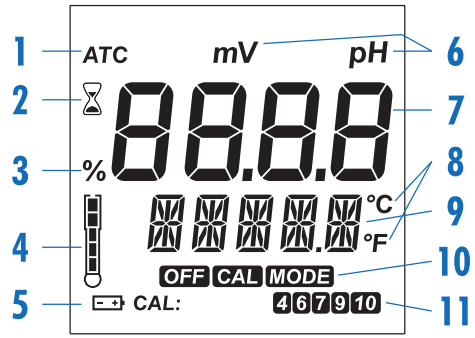
- Simultaneous pH and temperature measurements on a large dual-line LCD display
- Automatic pH calibration at one or two points within two memorized buffer sets (standard or NIST)
- Selectable temperature unit (°C or °F)
- Electrode condition indicator
- mV of pH measurement for electrode check
- HI14143/50 dedicated pH with integral temperature sensor
- Probe quick connect system
- Battery life indication and low battery detection
- Keystroke confirmation tone
- Auto-off function
- Waterproof casing IP67



Range*	-2.00 to 16.00 pH / -2.0 to 16.0 pH ±825 mV (pH-mV) -5.0 to 105.0 °C/23.0 to 221.0 °F
Resolution	0.01 pH / 0.1 pH 1 mV 0.1 °C/0.1 °F
Accuracy @ 20°C / 68°F	±0.02 pH / ±0.1 pH ±1 mV (pH-mV) ±0.5 °C up to 60 °C; ±1.0 °C outside ±1.0 °F up to 140 °F; ±2.0 °F outside
Temperature compensation	Automatic -5.0 to 105.0 °C/23.0 to 221.0 °F
pH Calibration	Automatic, 1 or 2 point selectable buffer set Standard: 4.01; 7.01; 10.01 or NIST: 4.01; 6.86; 9.18
Probe (included)	HI14143/50 preamplified pH and temperature probe with flat tip 50 mm-long body, DIN connector and 1 m (3.3') cable
Battery type / life	1.5V AAA (3 pcs.) approx. 1400 hours of continuous use
Auto-Off	user selectable: after 8 min, 60 min or disabled
Environment	0 to 50 °C (32 to 122 °F) RH max. 100%
Meter Dimensions	154 x 63 x 30 mm (6.1 x 2.5 x 1.2")
Meter Mass (with batteries)	196 g (6.91 oz.)
Case Ingress Protection Rating	IP67

* the HI14143/50 is limited to be used from 0 to 12 pH and from 0 to 50 °C temperature (32 to 122 °F).

1 Automatic Temperature Compensation indicator
2 Stability indicator
3 Battery percentage
4 Electrode condition indicator
5 Low battery indicator
6 Measurement unit
7 Primary LCD
8 Temperature unit
9 Secondary LCD
10 Meter modes indicator
11 pH calibration buffer(s) used



Each meter is supplied with batteries. Before using the meter for the first time, open the battery compartment and insert batteries, observing the polarity (see "Battery Replacement").

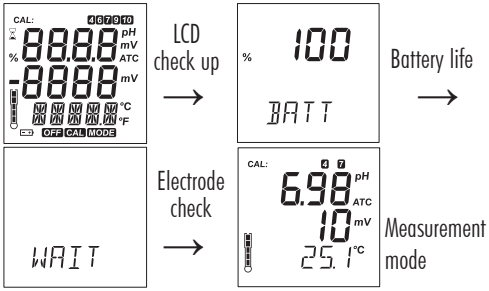
TO CONNECT THE ELECTRODE

With the meter turned off, connect the HI14143/50 probe to the DIN socket on the bottom of the meter by aligning the pins and pushing in the plug firmly. Remove the protective cap from the probe before taking any measurements.

TO TURN THE METER ON



To turn the meter ON, press the ⏻ button on the front of the meter. If it does not turn on, make sure that the batteries are properly installed in their place. The meter is provided with an active acoustic signal when a key is pressed. At start-up the meter displays all LCD segments for a few seconds, followed by the percentage indication of the remaining battery life, the meter enters the normal measurement mode.



Note: The meter detects the presence and the type of the probe at its input.

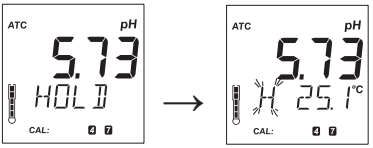
- *If the probe is not connected the message "**NO**" "**PROBE**" appears alternatively on the secondary LCD with "---" blinking on the first LCD line.*
- *If the probe is not compatible "**WRONG**" "**PROBE**" message appears alternatively on the secondary LCD with "---" blinking on the first LCD line.*
- *If the readings are out of range, the nearest range limits are displayed blinking (E.g. -2.00 pH -5.0 °C).*

TO SELECT THE MEASUREMENT RANGE

While in measurement mode, press the **SET** button to select pH or pH-mV measurement on the first LCD line.

TO FREEZE THE MEASUREMENT VALUES

While in measurement mode, press and hold the **SET** button until "**HOLD**" appears on the secondary LCD. The "**HOLD**" remains for 1 second and reading of pH, mV and temperature will be frozen on the LCD with "**H**" blinking.



Press any button to resume active measurements.

TO ENTER CALIBRATION MODE

Press and hold the ⏻ button until "**POWER**" and **OFF** tag is replaced by "**STD**" and **CAL** tag. Release the button.

TO ENTER SETUP MODE

Press and hold ⏻ button until "**STD**" and **CAL** tag is replaced by "**SETUP**" and **MODE** tag. Release the button.

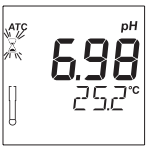
TO TURN THE METER OFF

While in measurement mode, press the ⏻ button. "**POWER**" and **OFF** tag will appear. Release the button.

pH MEASUREMENT & CALIBRATION

Make sure the meter has been calibrated before use.

If the probe is dry, soak it in HI70300 storage solution for 30 minutes to reactivate it. If fouled, clean the electrode by soaking in cleaning solution for 20 minutes, then rinse the tip and soak in storage solution at least 30 minutes before use. Rinse the electrode off well and shake off excess droplets. Recalibrate before using. Submerge the probe in the sample to be tested while stirring it gently. Wait until the ⌛ tag on the LCD disappears.



The LCD displays the pH value (automatically compensated for temperature) on the primary LCD, while the secondary LCD displays the sample temperature.

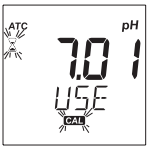
If measurements are taken in different samples successively, rinse the probe tip thoroughly† to eliminate cross-contamination.

For better accuracy, frequent calibration of the pH sensor with the meter is recommended. In addition, the meter must be recalibrated whenever:

a) The pH electrode is replaced.
b) After testing aggressive chemicals.
c) Where high accuracy is required.
d) At least once a month.
e) After cleaning the sensor.

† *The probe tip should be rinsed with purified water (reverse osmosis, distilled, or deionized) before and after placing in any solution (buffer, storage, or sample).*

pH calibration



Enter calibration mode while in pH measurement mode. Place the sensor into the first calibration buffer. If performing a two-point calibration, use pH 7.01 (pH 6.86 for NIST) buffer first. The meter will enter the calibration mode, displaying "**pH 7.01 USE**" CAL and ⧖ tag blinking (or "**pH 6.86 USE**" for NIST).

Follow directions for single and two-point calibration below:

Single-point calibration

1. Place the probe in any buffer from the selected buffer set. The meter will automatically recognize the buffer value.
2. If the buffer is not recognized or the calibration offset is out of the accepted range "**---- WRONG**" is displayed.
3. If the buffer is recognized "**REC**" is displayed then "**WAIT**" until the calibration is accepted.

If using pH 7.01 (or pH 6.86 for NIST), after acceptance of the buffer press any key to exit. The "**SAVE**" message is displayed and the meter returns to pH measurement mode. If using pH 4.01 or 10.01 (or pH 9.18 for NIST) buffer the "**SAVE**" message is displayed and meter returns to pH measurement mode.

Two-point calibration

Proceed with steps 1 through 3 under single point calibration using 7.01 (pH 6.86 for NIST) pH buffer first. Then follow steps below:

The "**pH 4.01 USE**" message is then displayed.

Place the probe in the second calibration buffer (pH 4.01 or 10.01, or, if using NIST, pH 4.01 or 9.18). When the second buffer is accepted, the LCD will display "**SAVE**" for 1 second and the meter will return to the normal measurement mode.

If the buffer is not recognized or the slope is out of accepted range "**--- WRONG**" is displayed. Change the buffer, clean the electrode or press any key to exit calibration.

It is always recommended to carry out a two-point calibration for better accuracy.

When the calibration procedure is completed, the **CAL** tag is turned on together with the calibrated points.

To exit calibration and reset default values

After entering the calibration mode and before the first point is accepted, it is possible to quit the procedure and return to the last calibration data by pressing the ⏻ button. The LCD displays "**ESC**" for 1 second and the meter returns to normal mode.

To reset the default values and clear a previous calibration, press the **SET** button after entering the calibration mode and before the first point is accepted.

The LCD displays "**CLEAR**" for 1 second, the meter resets to the default calibration and the **CAL** tag with the calibrated points on the LCD disappears.

ELECTRODE CONDITION

The display is provided with a probe icon (unless the feature is disabled from setup) which indicates the electrode status after calibration. The "condition" remains active for 12 hours (unless the batteries are removed).

The electrode condition is evaluated only if the current calibration has two points.



5 bars: excellent condition
4 bars: very good condition
3 bars: good condition
2 bars: fair condition
1 bar: poor condition
1 bar blinking: very poor condition

With 1 bar it is recommended to clean the electrode and recalibrate. If there is still only 1 bar or 1 bar blinking replace the probe.

Sensor Check

Setting the meter to pH-mV range the user can check the sensor status at any time. The offset value is the reading in pH 7.01 buffer (@ 25 °C/77 °F). If this reading is outside the range ±30 mV, the electrode is considered "very poor". The slope value of the sensor is the difference between readings in pH 7.01 and in pH 4.01 buffers. When the slope reaches the value of about 150 mV, the electrode is considered "very poor". When "poor" or "very poor", it is recommended to replace it with a new one.

Note: To ensure reliable readings, the electrode must be cleaned with cleaning solution and then hydrated in storage solution for a minimum of 30 minutes before calibrating the probe.

Setup mode allows the selection of the Temperature unit, Auto-off, Beep, the type of pH buffer set, the Resolution and Information. To enter Setup mode press and hold ⏻ button until "**STD**" and **CAL** tag is replaced by "**SETUP**" and **MODE** tag. Release the button.

- "**TEMP**" is displayed on the secondary LCD with the current temperature unit (E.g. "**TEMP °C**"), for °C/°F selection, use the **SET** button. After the temperature unit has been selected, press ⏻ to confirm and to enter the "**A-OFF**" selection.



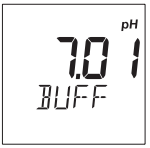
- Use the **SET** button, to cycle through the auto-off choices: 8 minutes ("**8**", default value), 60 minutes ("**60**") or disabled ("**---**"). Press ⏻ to confirm and to enter the "**BEEP**" selection.



- To switch ON or OFF the beep tone, press the **SET** button; press ⏻ to confirm and to enter the calibration buffer selection "**pH 7.01 BUFF**".



- To change the type of calibration buffer set, the meter will show the current buffer set: "**pH 7.01 BUFF**" (for standard buffer set: 4.01/7.01/ 10.01) or "**pH 6.86 BUFF**" (for NIST buffer set: 4.01/6.86/ 9.18). Change the set with the **SET** button. Press ⏻ to confirm and to enter pH resolution selection "**RESOL**".



- To change the pH measurement resolution between "**0.1**" and "**0.01**" use the **SET** button; then press ⏻ to confirm and to enter electrode calibration information "**INFO**" selection.

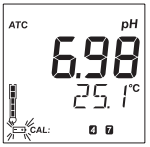


- To switch ON or OFF the electrode condition indicator on the LCD, press the **SET** button; press ⏻ to exit setup options; Change the set with the **SET** button, then press ⏻ to confirm and to return to normal mode.



BATTERY REPLACEMENT

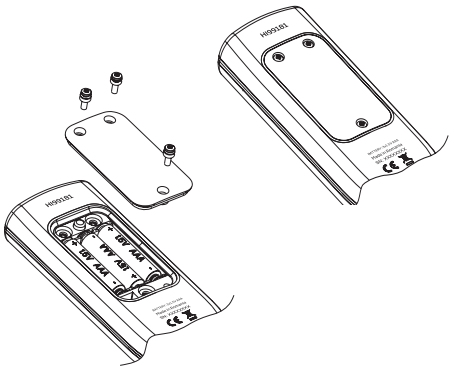
When the remaining battery life is less than 10% the battery tag blinks on the display to warn the user.



Battery Error Prevention System (BEPS)

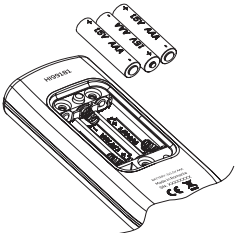
If the battery is too weak (“**0%**”) the display shows “**bAtt**“, “**DEAD**“ for few seconds then the meter power off. Immediately replace the batteries with new ones.

The batteries are accessed by opening the battery cover on the back of the instrument. Remove protective boot if present.



BATTERY REPLACEMENT

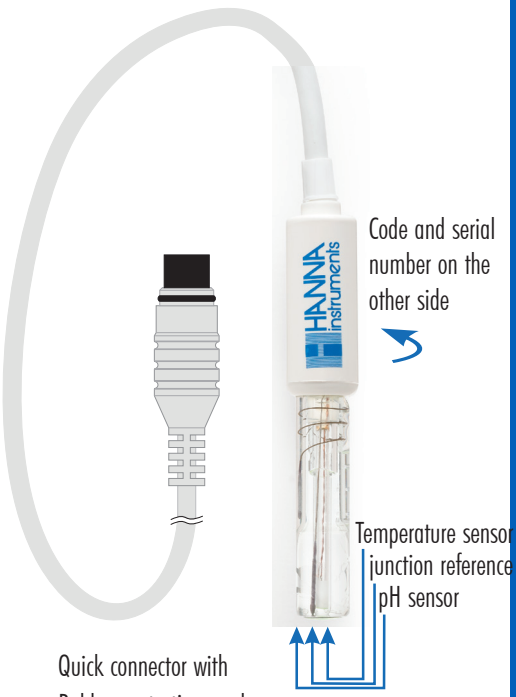
Replace the three 1.5V AAA alkaline batteries located in the battery compartment, observing the indicated polarity.



Replace the battery cover making sure that the gasket is in place.

ACCESSORIES

HI14143/50	Preamplified pH/temperature probe with flat tip 50 mm-long body, DIN connector and 1 m (3.3') cable
HI7004L	pH 4.01 buffer solution, 500 mL
HI7006L	pH 6.86 buffer solution, 500 mL
HI7007L	pH 7.01 buffer solution, 500 mL
HI7009L	pH 9.18 buffer solution, 500 mL
HI7010L	pH 10.01 buffer solution, 500 mL
HI70300L	pH electrode storage solution, 500 mL
HI7061L	pH electrode cleaning solution, 500 mL
HI70620L	Cleaning and disinfection solution for skin residual, 500 mL
HI70621L	Cleaning solution for skin grease and sebum, 500 mL
HI710029	Silicon rubber boot blue color
HI76405	Electrode holder
HI77400P	Calibration kit (pH 4 & 7, 20 mL, 5 pcs. each)



PREPARATION

- Remove the protective cap. DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT. Rinse with water.
- Shake the electrode down as you would do with a clinical thermometer to eliminate any air bubbles inside the glass.
- If the glass and/or junction are dry, soak the electrode in HI70300 Storage Solution for a minimum of 30 minutes.
- Rinse with water.
- Calibrate before using.

STORAGE

- To ensure a quick response, the glass and the junction should be kept moist and not allowed to dry.
- Replace protective cap with a few drops of HI70300 Storage Solution. Follow PREPARATION above before taking measurements.

Note: NEVER STORE THE ELECTRODE IN DISTILLED WATER.

ELECTRODE MAINTENANCE

PERIODIC MAINTENANCE

- Inspect the electrode for any scratches or cracks. If any present, replace the electrode.
- Rinse off any salt deposits with water.
- Follow the STORAGE procedure above.

CLEANING PROCEDURE

- Soak in Hanna HI7061 general cleaning solution, HI700620 cleaning and disinfection solution for skin residual or HI700621 cleaning solution for skin grease and sebum for 20 minutes. Rinse with water.

IMPORTANT: After performing any of the cleaning procedures rinse the electrode thoroughly with distilled water. Soak the electrode in HI70300 Storage Solution for a minimum of 30 minutes. Rinse with water. Calibrate before using.

TROUBLESHOOTING

- pH Meter: Follow the meter's operating and calibration procedures.
- Electrode: Evaluate your electrode performance based on the SENSOR CHECK procedure on page 13.

CERTIFICATION

All Hanna Instruments conform to the **CE European Directives**.

CE RoHS compliant

Disposal of Electrical & Electronic Equipment. The product should not be treated as household waste. Instead hand it over to the appropriate collection point for the recycling of electrical and electronic equipment which will conserve natural resources.

Disposal of waste batteries. This product contains batteries, do not dispose of them with other household waste. Hand them over to the appropriate collection point for recycling.

Ensuring proper product and battery disposal prevents potential negative consequences for the environment and human health. For more information, contact your city, your local household waste disposal service, the place of purchase or go to www.hannainst.com.

MAN99181 05/18

Recommendations for Users

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used. Any variation introduced by the user to the supplied equipment may degrade the meters' performance. For yours and the meter's safety do not use or store the meter in hazardous environments.

Warranty

HI99181 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. This warranty is limited to repair or replacement free of charge. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your local Hanna Instruments Office. If under warranty, report the model number, date of purchase, serial number (see engraved in the back of the meter) and the nature of the problem. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the meter is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Technical Service department and then send it with shipping costs prepaid. When shipping any meter, make sure it is properly packed for complete protection.

Hanna Instruments reserves the right to modify the design, construction or appearance of its products without advance notice.

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