User Manual
DOCUMENT #601119REF

EcoSense® pH1000A

pH, mV (ORP), and Temperature Benchtop Meter

USER MANUAL

English

Item #601119REF
Rev C, October 2017
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WARRANTY

The EcoSense® pH1000A instrument is warranted for one (1) year from date of purchase by the end user against defects in materials and workmanship, exclusive of batteries and any damage caused by defective batteries. pH1000A cable/sensor assemblies are warranted for six (6) months from date of purchase by the end user against defects in material and workmanship. Within the warranty period, YSI will repair or replace, at its sole discretion, free of charge, any product that YSI determines to be covered by this warranty.

To exercise this warranty, call your local YSI representative, or contact YSI Customer Service in Yellow Springs, Ohio at +1 937 767-7241, 800-897-4151 or visit www.YSI.com for a Product Return Form. Send the product and proof of purchase, transportation prepaid, to the Authorized Service Center selected by YSI. Repair or replacement will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days from date of repair or replacement.

LIMITATION OF WARRANTY

This Warranty does not apply to any YSI product damage or failure caused by:

- Failure to install, operate or use the product in accordance with YSI's written instructions;
- Abuse or misuse of the product;
- Failure to maintain the product in accordance with YSI's written instructions or standard industry procedure;
- Any improper repairs to the product;
- Use by you of defective or improper components or parts in servicing or repairing the product;
- Modification of the product in any way not expressly authorized by YSI.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. YSI'S LIABILITY UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AND THIS SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY. IN NO EVENT SHALL YSI BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY.

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INTRODUCTION

Thank you for purchasing the EcoSense pH1000A, a precise laboratory benchtop meter that measures pH, mV and temperature. A built-in microprocessor stores, calculates and compensates for all parameters related to pH determinations including pH electrode temperature characteristics, electrode slope deviations and buffer solutions.

The mechanical keys are highly reliable with tactile and audio feedback. The front of the meter has a large LCD that displays pH or mV and temperature simultaneously along with user prompts and mode indicators.

An AUTOLOCK feature for both pH and mV measurements enables the unit to automatically sense the end point and "LOCK" the display to indicate the end point value of a measurement. AUTOLOCK and user prompts help eliminate most errors in determining pH and mV values, resulting in precise, repeatable and error-free measurements. The pH1000A can also be used in non-AUTOLOCK mode.

Other features include single, dual or three point calibration; electrode offset recognition; electrode slope recognition; electrode efficiency display; built-in buffer coefficients; automatic or manual temperature compensation; and long battery life. This meter is user-friendly for laboratory application.

The following sensors are available for use with the pH1000A:

- **1101** pH electrode (item # 601101).
- **1102** pH/ATC (Automatic Temperature Compensation) probe (item # 601102). This is a pH electrode with a convenient built-in temperature sensor.
- **1103** temperature sensor (item # 601103).
- **115-1**: ORP electrode (item # 605376).

Note: The instrument features a BNC connector for pH and ORP electrodes. Any pH or ORP electrode with a BNC connection can be used, but the 1103 temperature sensor will need to be used for the instrument to automatically compensate pH measurements for temperature.

For additional product specification information, please visit ysi.com or contact Technical Support at 800-897-4151 (+1 937 767-7241) or info@ysi.com.

GETTING STARTED

INITIAL INSPECTION

Carefully unpack the instrument and accessories and inspect for damage. If any parts are damaged or missing, contact YSI Customer Service at 800-897-4151 (+1 937 767-7241) or the authorized YSI distributor where the instrument was purchased.

PRECAUTIONS

THE ELECTRODE

pH and ORP electrodes should not be allowed to dry out. When not in use, place a small amount of pH 4 buffer, potassium chloride (KCl) solution, or clean water in the electrode cap and install the cap over the sensor. Deionized (DI) water should never be used for storage, as it can permanently damage the electrode. DI water can be used for rinsing between measurements or calibration points.

INSTRUMENT POWER

The pH1000A can be powered by the power supply included with the instrument or with 6 "AA" alkaline batteries. Check the label on the AC adaptor supplied with the instrument to make sure that the AC line voltage is correct. If the wrong AC adaptor is supplied, notify your YSI representative immediately.

INSTALLING THE BATTERIES

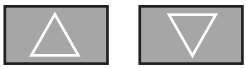
To install (or replace) the batteries, follow the procedure outlined below.

1. Remove the battery cover by unscrewing (counter-clockwise) the cover screw with a Phillips-head screwdriver.
2. Replace the old batteries (if applicable). Insert the new batteries, ensuring correct polarities as marked.
3. Install the battery cover, then hand tighten the cover screw with a screwdriver.

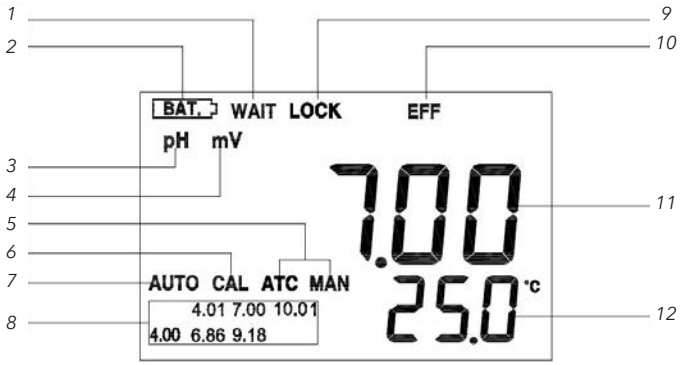
Battery Disposal

Battery disposal requirements vary by country and region, and users are expected to understand and follow the battery disposal requirements for their specific locale.

KEY PAD

Key	*Description*
	**Power** key. Press and hold for 3 seconds to power on the meter. Pressing this key will also turn the instrument off.
	**Up and down arrow** keys are used to manually enter temperature values. They have no effect on the unit when operating in ATC mode.
	**Mode** selects display mode. Pressing this key changes the display sequentially to display pH-AUTO, mV-AUTO, pH and mV. The calibration values will not be affected by changing the display modes. Press the Mode key to exit a pH calibration early (i.e. complete a 1 or 2 point calibration).
	**Clear** key. Press to clear any errors that are displayed. Press and hold for 2 seconds to clear all calibration values stored in the internal memory. After 2 seconds the unit will enter the pH-AUTO mode. "AUTO" and "CAL" will be displayed and one of the buffers in the pre-selected buffer set will start to flash. This means that the unit must be calibrated again before use.
	**Stand/Slope** is used for pH calibration of the unit. Pressing and holding the Stand key while turning on the power will change the buffer set.
	**Meas. / Effic.** is used to bring the unit out of the AUTO condition when operating in the pH-AUTOLOCK or mV-AUTOLOCK mode. Press and hold this key for 5 seconds for the electrode efficiency to be displayed.

MAIN DISPLAY



Number	*Description*
1	**WAIT**: This will be displayed when the unit is still waiting for a stable reading.
2	**BAT**: Low battery indicator.
3	**pH**: Unit and mode indicators.
4	**mV**: Unit and mode indicators.
5	**ATC/MAN**: ATC indicator will be displayed if a temperature probe is connected, otherwise the MAN indicator will be displayed.
6	**CAL**: This will be displayed when the unit enters the calibration mode.
7	**AUTO**: AUTOLOCK mode indicator.
8	**Buffer selection**: This indicator will flash if the pH1000A needs to be recalibrated. This indicator also identifies the buffer set currently selected.
9	**LOCK:** This will indicate the reading is frozen during AUTOLOCK mode.
10	**EFF**: This will be displayed if the user is viewing the efficiency of the electrode. It is recommended to clean and/or replace the electrode when the efficiency value is less than 90%.
11	**MAIN DISPLAY**: pH, mV and probe efficiency values.
12	**SECONDARY DISPLAY:** Temperature display in °C.

BUFFER SET SELECTION

The pH1000A has two buffer sets: 7.00, 4.01, 10.01 pH and 6.86, 4.00, 9.18 pH. The 7.00, 4.01 and 10.01 pH buffer set is the factory default.

The pH1000A will automatically recognize the buffer used as long as the correct buffer set is selected and the electrode is in good operating condition. Additionally, the pH1000A will automatically adjust the buffer value for temperature during calibration (see Appendix A).

To change the buffer set, turn off the unit, then press and hold the **Stand** key while turning on the unit again. There is no need to repeat this procedure every time the unit is power up unless the selected buffer set needs changed.

pH CALIBRATION

The pH1000A can be calibrated to one, two or three points. The first calibration point must be 6.86 or 7.00, depending on the buffer set selected.

CALIBRATION IN THE pH AUTOLOCK MODE

In the pH AUTOLOCK mode, the meter will wait for the measurement value to become stable before completing the calibration.

1. Turn the unit on. Press and hold the **Clear** key for 2 seconds - all LCD elements will light up. The meter clears all calibration values stored in internal memory.
2. Connect the pH electrode to the BNC input and the temperature connector to the temperature input. The "pH" icon and "AUTO" icon will light up. One of the buffers in the pre-selected buffer set will start to flash.
    - The "ATC" icon will light up if a temperature sensor is connected.
    - The "MAN" icon will light up if no temperature sensor is connected.
3. Rinse the pH and temperature (if applicable) sensors with distilled water and immerse in pH 7 or 6.86 buffer solution, depending on the buffer set selected. Allow the temperature reading to stabilize if a temperature sensor is connected, or manually change the temperature reading with the **up** and **down** keys if no temperature sensor is connected.

4. Press and hold the **Stand** key for 2 seconds to calibrate. The "WAIT" icon will flash until the unit detects a stable reading. The buffer used for the first point will remain lit on the display while the remaining two buffers start to flash. The unit is ready to be calibrated using the second buffer solution.
    - To complete a one point calibration, press the **Mode** key after successful calibration using the first buffer.
5. Rinse the pH and temperature (if applicable) sensors with distilled water and immerse in the second buffer solution (either 4.00/4.01 or 9.18/10.01). Allow the temperature reading to stabilize if a temperature sensor is connected, or manually change the temperature reading with the **up** and **down** keys if no temperature sensor is connected.
6. Press the **Slope** key to calibrate to the second point. The "WAIT" icon will flash until the unit detects a stable reading. Once the unit calibrates the second point, the buffers already used will be lit on the screen, while the remaining buffer will start to flash. The unit is ready to be calibrated using the third buffer solution.
    - To complete a two point calibration, press the **Mode** key after successful calibration using the first two buffers.
7. Repeat steps #5 and #6 for the remaining buffer solution. The pH1000A will automatically exit the pH calibration mode after successful calibration with the third buffer.

CALIBRATION IN THE pH NON-AUTOLOCK MODE

In the pH NON-AUTOLOCK mode, the instrument will not wait for stabilization before accepting the calibration point.

1. Turn the unit on. Press **Clear** key for 2 seconds - all LCD elements will light up. The meter clears all calibration values stored in internal memory.
2. Press the **Mode** key to select the "pH" mode. ***The "AUTO" icon will not be on the display when in the NON-AUTOLOCK mode.***
3. Connect the pH electrode to the BNC input and the temperature connector to the temperature input. One of the buffers in the pre-selected buffer set will start to flash.
    - The "ATC" icon will light up if a temperature sensor is connected.
    - The "MAN" icon will light up if no temperature sensor is connected.
4. Rinse the pH and temperature (if applicable) sensors with distilled water and immerse in pH 7 or 6.86 buffer solution, depending on the buffer set selected. ***Allow sufficient time for the pH measurement to stabilize***. Also allow the temperature reading

to stabilize if a temperature sensor is connected, or manually change the temperature reading with the **up** and **down** keys if no temperature sensor is connected.

5. Press and hold the **Stand** key for 2 seconds to calibrate. The unit will immediately be calibrated to the first point. The buffer used for the first point will remain lit on the display while the remaining two buffers start to flash. The unit is ready to be calibrated using the second buffer solution.
    - To complete a one point calibration, press the **Mode** key after successful calibration using the first buffer.
6. Rinse the pH and temperature (if applicable) sensors with distilled water and immerse in the second buffer solution (either 4.00/4.01 or 9.18/10.01). Allow sufficient time for the pH measurement to stabilize. Also allow the temperature reading to stabilize if a temperature sensor is connected, or manually change the temperature reading with the **up** and **down** keys if no temperature sensor is connected.
7. Press the **Slope** key to calibrate to the second point. The unit will immediately be calibrated to the second point. The buffer used for the first and second point will be lit on the display, while the remaining buffer will start to flash. The unit is ready to be calibrated using the third buffer solution.
    - To complete a two point calibration, press the **Mode** key after successful calibration using the first two buffers.
8. Repeat steps #5 and #6 for the remaining buffer solution. The pH1000A will automatically exit the pH calibration mode after successful calibration with the third buffer.

VIEWING THE ELECTRODE EFFICIENCY AFTER CALIBRATION

The pH1000A calculates and compensates for the pH electrode slope deviation corresponding to the values of the three calibration buffers. After calibration, press and hold **Meas. / Effic.** key for 5 seconds to display the new electrode efficiency.

Electrode efficiency can be converted into a mV/pH slope value based on the following equation, with -59.16 mV/pH being the theoretical Nernst Slope:

- $\text{Electrode Efficiency} = \frac{\text{Observed Slope}}{-59.16\ \text{mV/pH}} * 100$

A single electrode efficiency will be displayed after a single point calibration. This efficiency will always equal 100%, as the theoretical Nernst Slope will always be used for the observed slope. This is why YSI recommends at least a two point calibration.

A single electrode efficiency will also be displayed after a two point calibration. This is the efficiency between the two calibration points. Two separate efficiencies will be displayed after a three point calibration, one for the slope between 4.01/4.00 and 7.00/6.86 and another for the slope between 7.00/6.86 and 10.01/9.18.

It is recommended to clean and/or replace the electrode when the efficiency value is less than 90%.

pH MEASUREMENTS

The buffer(s) on the display represent the buffers used during the most recent calibration. The selected buffer set must not be flashing before taking measurements. If it is flashing, a calibration must be performed.

MEASUREMENTS IN THE pH AUTOLOCK MODE

1. Press the **Mode** key until the "pH" icon and "AUTO" icon light up.
    - The "ATC" icon will light up if a temperature sensor is connected.
    - The "MAN" icon will light up if no temperature sensor is connected. The temperature can manually be set by pressing the **up** and **down** arrow keys.
2. Rinse the pH and temperature (if applicable) sensors with distilled water and immerse in the sample to be measured. Remove any air bubbles trapped around the electrode by shaking or stirring the electrode.
3. Press the **Meas. / Effic.** key. The "WAIT" icon will start flashing. The unit is waiting for a stable pH and temperature measurement.
4. When the "WAIT" icon disappears and the "LOCK" icon appears, the reading is frozen and will not respond to further changes. The pH value shown is the pH value of the sample at the displayed sample temperature.
    - *For samples that are inherently unstable, the unit will not AUTOLOCK. In this case, use the pH NON- AUTOLOCK mode for measurements.*

MEASUREMENTS IN THE pH NON-AUTOLOCK MODE

1. Press the **Mode** key until the "pH" icon lights up. *The "AUTO" icon will not be on the display when in the NON-AUTOLOCK mode.*
    - The "ATC" icon will light up if a temperature sensor is connected.
    - The "MAN" icon will light up if no temperature sensor is connected. The temperature can manually be set by pressing the **up** and **down** arrow keys.

2. Rinse the pH and temperature (if applicable) sensors with distilled water and immerse in the sample to be measured. Remove any air bubbles trapped around the electrode by shaking or stirring the electrode.
3. Allow sufficient time for the display to stabilize. The unit will not lock the measurement on the display, so it is up to the user to determine when the measurement is stable.

TEMPERATURE MEASUREMENTS

The pH1000A can measure temperature independently with the 1102 pH/ATC probe or the 1103 temperature probe. Place the sensor in the sample and the unit will display the measured temperature.

mV MEASUREMENTS

ORP measurements can be made with the YSI 115-1 (item # 605376) electrode, but any ORP electrode with a BNC connection can be used.

MEASUREMENTS IN THE mV AUTOLOCK MODE

1. Press the **Mode** key until the "mV" icon and "AUTO" icon light up.
2. Rinse the electrode with distilled water and immerse in the sample.
3. Press the **Meas. / Effic.** key. The "WAIT" icon will start flashing. The unit is waiting for a stable measurement.
4. When the "WAIT" icon disappears and the "LOCK" icon appears, the reading is frozen and will not respond to further changes.
    - *For samples that are inherently unstable, the unit will not AUTOLOCK. In this case, use the mV NON- AUTOLOCK mode for measurements.*

MEASUREMENTS IN THE mV NON-AUTOLOCK MODE

1. Press the **Mode** key until the "mV" icon lights up. *The "AUTO" icon will not be on the display when in the NON-AUTOLOCK mode.*
2. Rinse the electrode with distilled water and immerse in the sample to be measured.
3. Allow sufficient time for the display to stabilize. The unit will not lock the measurement on the display, so it is up to the user to determine when the measurement is stable.

TROUBLESHOOTING

Display	*Possible Cause(s)*	*Possible Solution(s)*
"Er1"	1. **Stand** was pressed before the electrode and ATC/Temp probe settled to within +/- 1.5 pH of the buffer value.	1. Press **Clear** key, allow sufficient time for the electrode and ATC/ Temp probe to stabilize, re-press **Stand** key to start the calibration procedure.
	2. pH electrode offset is greater / less than +/-1.5 pH.	2. Replace the buffer and /or the pH electrode. Press **Clear** key to recalibrate meter.
	3. pH electrode is faulty.	3. Replace electrode.
"Er2"	1. **Slope** was pressed before the electrode and ATC/ Temp probe settled to within 30% of the buffer value.	1. Allow sufficient time for the electrode and ATC/Temp probe to stabilize, re-press **Slope** key to continue the calibration procedure.
	2. Buffer 4.00/4.01 or 9.18/10.01 is not correct.	2. Check if the correct buffer is used.
	3. pH electrode slope is off by more than 30% of ideal slope.	3. Replace the buffer and /or the pH electrode. Press **Clear** key to recalibrate meter.
"Er3"	1. Temperature is out of the 0.0 to 60.0 °C range.	1. Bring the buffer temperature within range.
"over" or "undr"	1. Measured pH is out of the 0.00 to 14.00 pH range.	1. Bring sample pH into the correct measuring range.
	2. Measured mV is out of the –1999.9 to 1999.9 mV range.	2. Bring sample mV (ORP) into the correct measuring range.
	3. Measured temperature is out of the 0.0 to 100.0 °C range.	3. Bring sample temperature into the correct measuring range.

SPECIFICATIONS

These specifications represent typical performance and are subject to change without notice. For the latest product specification information, please visit YSI's website at ysi.com or contact YSI Tech Support.

pH1000A INSTRUMENT ONLY SPECIFICATIONS

These specifications reflect the range and resolution that can be displayed on the instrument, as well as the accuracy of the instrument electronics.

	Range	Resolution	Accuracy
pH	-2.00 to 16.00 pH	0.01 pH	+/- 0.01 pH
mV	-1999.9 to 1999.9 mV	0.1 mV	+/- 0.05% FS +/- 1 digit
Temp	0.0 to 100.0 °C	0.1 °C	+/- 0.2 °C

pH1000A GENERAL SPECIFICATIONS

Operating Temperature Range	0 °C to 50.0 °C
pH Buffer Recognition	pH 7.00, 4.01, 10.01 or pH 6.86, 4.00, 9.18
pH Temperature Compensation	AUTO/MAN 0.0°C to 100.0 °C
pH Buffer Temperature Range	0 °C to 60.0 °C
pH Electrode Offset Recognition	±100 mV at pH 7.00 or +108.3/-91.7 mV at pH 6.86
pH Electrode Slope Recognition	±30% at pH 4.00, 4.01, 9.18 and 10.01
Input Impedance	$>10^{12}\Omega$
Temperature Sensor	Thermistor, 10 kΩ at 25 °C
Power	6 X 1.5V AA Batteries or the included power supply
Calibration Back-up	EEPROM
Audio Feedback	All Touch Keys
End Point Sensing & Hold	Yes
Display	93 mm : 58 mm high LCD
Relative Humidity	up to 90%
Dimensions (W x D x H)	155 mm x 195 mm x 52 mm
Weight	590 grams with batteries installed 450 grams without batteries installed

ACCESSORIES / PART NUMBERS

Part Number	Description
601100	pH1000A Lab Instrument with Power Supply
601113	pH1000A Electrode Stand
601101	pH Electrode with 1 Meter Cable
601102	pH/ATC (Automatic Temperature Compensation) Combination Probe with 1 Meter Cable. ***Note:*** *This is a pH electrode with a built-in temperature sensor.*
601103	Temperature Probe with 1 Meter Cable.
601112	Replacement pH1000A Power Supply

CONTACT INFORMATION AND SERVICE

ORDERING AND TECHNICAL SUPPORT

Telephone: 800 897 4151 (US)
+1 937 767 7241 (Globally)
Monday through Friday, 8:00 AM to 5:00 ET
Fax: +1 937 767 9353 (orders)
+1 937 767 1058 (technical support)
Email: info@ysi.com
Mail: YSI Incorporated
1725 Brannum Lane
Yellow Springs, OH 45387
USA
Web address: ysi.com

When placing an order please have the following available:

1.) YSI account number (if available)
2.) Name and phone number
3.) Purchase Order or Credit Card
4.) Model Number or brief description
5.) Billing and shipping addresses
6.) Quantity

SERVICE INFORMATION

YSI has authorized service centers throughout the United States and Internationally. For the nearest service center information, please visit ysi.com and click 'Support' or contact YSI Technical Support directly at 800-897-4151.

When returning a product for service, include the Product Return form with cleaning certification. The form must be completely filled out for a YSI Service Center to accept the instrument for service. The form may be downloaded from ysi.com by clicking on the 'Support" tab, then the Product Return Form button.

RECYCLING

YSI is committed to reducing the environmental footprint in the course of doing business. Even though materials reduction is the ultimate goal, we know there must be a concerted effort to responsibly deal with materials after they've served a long, productive life-cycle. YSI's recycling program ensures that old equipment is processed in an environmentally friendly way, reducing the amount of materials going to landfills.

- Printed Circuit Boards are sent to facilities that process and reclaim as much material for recycling as possible.
- Plastics enter a material recycling process and are not incinerated or sent to landfills.
- Batteries are removed and sent to battery recyclers for dedicated metals.

When the time comes for you to recycle, follow the easy steps outlined at ysi.com.

APPENDIX A: TEMPERATURE COEFFICIENT OF pH BUFFERS

The temperature coefficients of pH calibration buffers 4.01, 7.00, and 10.01 (e.g. YSI buffers), as well as the 4.00, 6.86, and 9.18 buffer set, are stored inside the instrument. The buffers used to calibrate the instrument must exhibit the same temperature characteristics as the stored values.

	4.01, 7.00, 10.01 Buffer Set			4.00, 6.86, 9.18 Buffer Set		
0 °C	4.01	7.11	10.32	4.01	6.98	9.46
5 °C	4.01	7.08	10.25	4.00	6.95	9.39
10 °C	4.00	7.06	10.18	4.00	6.92	9.33
15 °C	4.00	7.03	10.12	4.00	6.90	9.28
20 °C	4.00	7.01	10.06	4.00	6.88	9.23
25 °C	4.01	7.00	10.01	4.00	6.86	9.18
30 °C	4.01	6.98	9.97	4.01	6.85	9.14
35 °C	4.02	6.98	9.93	4.02	6.84	9.10
40 °C	4.03	6.97	9.89	4.03	6.84	9.07
45 °C	4.04	6.97	9.86	4.04	6.83	9.04
50 °C	4.06	6.97	9.83	4.06	6.83	9.02
55 °C	4.08	6.97	9.80	4.07	6.83	8.99
60 °C	4.10	6.98	9.78	4.09	6.84	8.97

Note: The actual reading of the instrument can differ from the values shown by ±0.01pH.

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