

Model H10
Instruction Manual



Microprocessor based
pH, mV, Temperature
Hand Held Meter

Electro-Chemical Devices, Inc.

1681 Kettering, Irvine, CA 92614 USA
Telephone: +1-949-336-6060
FAX: +1-949-336-6064
www.ecdi.com



ELECTRO-CHEMICAL DEVICES

1681 Kettering, Irvine, CA 92614

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FAX: +1 (949) 336-6064

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Warranty

Electro-Chemical Devices, Inc. (ECD) warrants all products it manufactures to be free from defect in materials and factory workmanship, and agrees to repair or replace any product that fails to perform, as specified, within one (1) year after date of shipment.

This warranty shall not apply to any product that has been:

1. Subjected to misuse, negligence or accident;
2. Connected, installed, adjusted or otherwise used not in accordance with the instructions furnished by ECD;
3. Repaired, modified or altered by persons not authorized by ECD, resulting in injury to the performance, stability or reliability of the product.

This warranty is in lieu of any other warranty, expressed or implied. ECD reserves the right to make changes in the design or construction of its products at any time, without prior notification, and without incurring any obligation to make any changes in previously delivered products.

Seller's sole liabilities and the buyer's sole remedies under this agreement shall be limited to a refund in the purchase price, or at ECD's discretion, to the repair or replacement of any product that proves, upon ECD's examination, to be defective, when returned to the factory, transportation prepaid by the buyer, within one (1) year of the product's original shipment date. Seller shall not be liable for damages consequential or incidental to defects in any product, for failure of delivery in whole or in part, for injuries resulting from its use, or for any other cause.

This warranty and the writing attached constitute the full understanding of seller and the buyer, and no terms, conditions, understanding, or agreement purporting to modify or vary the terms hereof shall be binding unless hereafter made in writing and signed by an authorized official of Electro-Chemical Devices, Inc.

This warranty does not cover pH, ORP or Specific Ion measurement, reference or combination electrodes or electrode cartridges that have been commissioned in service.

If service or repair is required, please obtain the serial number(s) or sales order number of the product(s) in question and contact ECD's Service Department at: +1-800-729-1333 (USA/Canada) or +1-949-336-606

Specifications

Display	Range	Resolution	Accuracy
pH	-2.00 to 16.00 pH	0.01 pH	±0.1% FS
mV	-1999 to 1999 mV	1 mV	±0.1% FS
Temperature	0.0 to 100.0 °C	0.1 °C	±0.5 °C

pH buffer recognition	pH 7.00, 4.01, 10.01 or pH 6.86, 4.00, 9.18
pH Temperature compensation	AUTO/MAN -10.0°C to 120.0 °C
pH Buffer Temperature range	0°C to 60.0°C
pH Electrode Offset recognition	±90 mV at pH 7.00 or 6.86
pH Electrode Slope recognition	±30% at pH 4.00, 4.01, 9.18 and 10.01
Input Impedance	10 ¹² ohms
Power	Four "AAA" Batteries
Battery Life	~1000 hours
Calibration Back-up	EEPROM
Audio Feedback	All Touch Keys
Display	11mm : 7mm high LCD
Ambient Temperature	0 to 50 °C
Relative Humidity	up to 90%
Case	IP67 watertight case
Dimensions	75mm x 157mm x 35mm
Weight	230 grams(Batteries included)

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General Introduction

Thank you for selecting the Model H10 pH meter. The Model H10 is a precision tool 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.

This meter has a waterproof IP67 case. The mechanical keys are highly reliable with tactile and audio feedback. This meter is powered by four AAA-size alkaline batteries. The meter also displays a “BAT” message when the batteries are in need of replacement. Re-calibration is not required when power is restored.

The front of the meter has a large LCD that displays pH or mV and temperature simultaneously along with user prompts and mode indicators. The unit prompts the user through calibration and measurement procedures.

An AUTOLOCK feature for both pH and mV measurements enables the unit to automatically sense the end point and “HOLD” 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 Model H10 can also be used in non-AUTOLOCK mode.

The Model H10 is available with pH, ORP and ATC (Automatic Temperature Compensation) probes. Other features include electrode offset recognition, electrode slope recognition; electrode efficiency display, built-in buffer coefficients, automatic or manual temperature compensation, long battery life, and 50/60Hz AC noise rejection. This meter is user-friendly, for field, industrial and laboratory applications.

Initial Inspection

Carefully unpack the unit and accessories. Inspect for damages made in shipment. If any damage is found, notify your **ECD** representative immediately. All packing materials should be saved until satisfactory operation is confirmed.

Error Displays and troubleshooting

Main Display	Possible Causes	Corrective Actions
“Er1”	<ul style="list-style-type: none"> • “Stand” was pressed before the electrode and ATC/Temp probe settled to within +/-1.5 pH of the buffer value. • pH electrode offset is greater / less than +/-1.5 pH. • pH electrode is faulty. 	<ul style="list-style-type: none"> • Press “Clear” key, allow sufficient time for the electrode and ATC/Temp probe to stabilize, re-press “Stand” key to start the calibration procedure. • Replace the buffer and /or the pH electrode. Press “Clear” key to recalibrate meter. • Replace electrode.
“Er2”	<ul style="list-style-type: none"> • “Slope” was pressed before the electrode and ATC/Temp probe settled to within 30% of the buffer value. • Buffer 4.00, 4.01, 9.18 and 10.01 is not correct. • pH electrode slope is off by more than 30% of ideal slope. 	<ul style="list-style-type: none"> • Allow sufficient time for the electrode and ATC/Temp probe to stabilize, re-press “Slope” key to continue the calibration procedure. • Check if the correct buffer is used. • Replace the buffer and /or the pH electrode. Press “Clear” key to recalibrate meter.
“Er3”	Temperature is out of the 0.0 to 60.0°C range.	Bring the buffer temperature within range.
“Over” Or “Undr”	<ul style="list-style-type: none"> • Measured pH is out of the 2.00 to 16.00 pH range. • Measured mV is out of the 1999 to 1999 mV range. • Measured temperature is out of the -10.0 to 120.0°C range. 	<ul style="list-style-type: none"> • Bring sample pH into the correct measuring range. • Bring sample ORP into the correct measuring range. • Bring sample temperature into the correct measuring range.

pH Calibration Buffer Table

The temperature coefficient of pH calibration buffers 4.01, 6.86, 7.00, 9.18 and 10.01 are stored inside the instrument. The buffers used to calibrate the instrument must exhibit the same temperature characteristics as the stored values.

Temperature coefficient of the pH buffers

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

Waterproof

Though the Model H10 meter is housed in a watertight case, **DO NOT** use it underwater. The watertight case prevents permanent damage to the unit if accidentally dropped into non-corrosive solutions.

Follow these steps immediately if the unit is immersed in any solution:

1. Rinse unit carefully with distilled water. After rinsing and drying, inspect and clean connectors to remove all contaminants that may affect probe connections.
2. Wait for the unit and probe to dry completely before resuming operation.
3. If the unit does not function correctly after steps 1 and 2, call ECD for possible repair or replacement (see Warranty).

Installing the Batteries

The Model H10 pH meter is packaged with 4 “AAA” alkaline batteries required for operation. To insert the batteries into the meter, follow the procedure outlined below.

1. Use a screw driver to remove the two screw and battery cover to expose the battery compartment. (Figure 1)
2. Note the polarity and insert the batteries into the battery compartment correctly.
3. Replace the battery cover and make sure to secure the two screws for the water-tight feature.

[Note: Press the “On/Off” key to turn the unit on. If the unit is running, then you can press the “On/Off” key to turn the unit off. The unit will automatically turn off after 20 minutes of no key activity.]

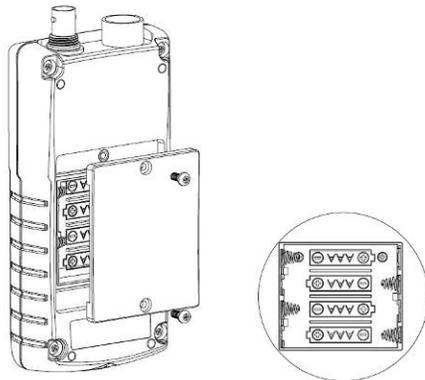


Figure 1

D. Temperature Measure

The pH6810 can measure temperature independently with the ATC/temp probe without using the pH electrode. Place the ATC/temp probe in the sample. The unit will display the measured temperature.

E. mV Measurements

Measurement in the mV-AUTOLOCK mode

1. Connect the optional combination ORP electrode to the BNC connector of the unit.
2. Press “Mode” key until “mV” icon and “AUTO” icon lit up.
3. Rinse electrode with distilled water and immerse it in sample to be measured.
4. Press the “Mea.” key. The “WAIT” icon will start flashing. The unit is waiting for a stable reading. The display will track the mV value as sensed by the ORP electrode
5. When the “WAIT” icon disappears, the reading is then “HOLD” and will not respond to further changes from the sample. The mV value is the sample reading.

[Note: For samples that are inherently unstable, the unit will not AUTOLOCK. In this case, use the pH NON-AUTOLOCK mode for measurements.]

Measurement in the mV NON-AUTOLOCK mode

1. Connect the optional combination ORP electrode to the BNC connector of the unit.
2. Press “Mode” key until “mV” icon light up.
3. Rinse electrode with distilled water and immerse it in sample to be measured.
4. Allow sufficient time for the display to stabilize. The instrument will display the mV value of the sample.

- Press “Mode” key until “pH” icon and “AUTO” icon light up.
- Rinse the pH electrode probe with distilled water and immerse in the sample to be measured. Remove any air bubbles trapped around the probe by shaking or stirring the probe.
- Press the “Mea.” key. The “WAIT” icon will start flashing. The unit is waiting for a stable reading. The display will track the pH value as sensed by the pH electrode probe.
- When the “WAIT” icon disappears, the reading is then “HOLD” and will not respond to further changes from sample. The pH value shown is the pH value of the sample at the set sample temperature.

[**Note:** For samples that are inherently unstable, the instrument will not AUTOLOCK. In this case, use the pH NON- AUTOLOCK mode for measurements.]

Measurement with an ATC/Temp probe in the pH

NON-AUTOLOCK mode

- Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the unit. The “ATC” icon will light up.
- Press “Mode” key until “pH” icon light up.
- Rinse the pH electrode and ATC/temp probe with distilled water and immerse in the sample to be measured.
- Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample at the displayed sample temperature.

Measurement with manual temperature

compensation in the pH NON-AUTOLOCK mode

- Connect the pH electrode to the BNC connector of the unit. The “MAN” icon will light up.
- Press “Mode” key until “pH” icon light up.
- Rinse the pH electrode probe with distilled water and immerse in the sample to be measured.
- Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample at the set sample temperature.

Display and Key Functions

A. Display

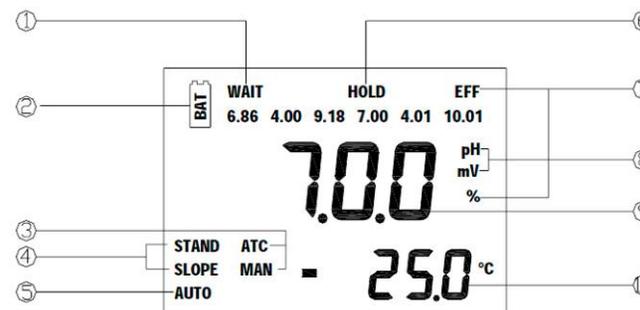


Figure 2

<p>1. WAIT This will be displayed when the unit is still waiting for a stable reading or end point sensing.</p>	<p>6. HOLD This will indicate that the reading is frozen during AUTOLOCK mode.</p>
<p>2. BAT- Low Battery Indicator</p>	<p>7. EFF (%)- This will be displayed if the user is viewing the efficiency of the electrode. It is recommended to use a new electrode when the efficiency value is less than 75%.</p>
<p>3. ATC/MAN ATC indicator will be displayed if a temperature probe is connected otherwise the MAN indicator will be displayed.</p>	<p>8. pH/mV Unit and mode indicators.</p>
<p>4. STAND/SLOPE This indicator will flash if the STAND or SLOPE is not yet calibrated. This indicator will remain lit-up if the STAND or SLOPE has been calibrated respectively.</p>	<p>9. Main display for pH, mV and probe efficiency values</p>
<p>5. AUTO- Auto Lock mode indicator</p>	<p>10. Temperature and unit display</p>

B. Keys

	<p>On/Off- Powers on and shuts off the meter.</p>
	<p>Mode- Selects display mode. Pressing this key changes the display sequentially to display pH-AUTOLOCK, mV-AUTOLOCK, pH and mV. The calibration values will not be affected by changing the display modes. In "pH calibration", press "Mode" key to exit the two point calibration mode.</p>
	<p>Clear- It is used to clear the unit when error signal appears. It clears all calibration values stored in the internal memory. Under normal use the key will not be activated unless pressed and held for 2 seconds to prevent accidental erasing stored memory. When the Clear key is pressed, all segments of the LCD will be on. After about 2 seconds the unit will enter the pH-AUTOLOCK mode. The "AUTO" will be on and "STAND" will start to flash. This means that the unit must be calibrated.</p>
	<p>Up/Down- Increases or decreases the displayed value as desired</p>
	<p>Stand/Slope- The Stand and Slope keys are used for dual or three point pH calibration of the unit. Pressing and holding the Stand key while turning on the power, will change the buffer set to the other available buffer set.</p>
	<p>Mea. / Eff.- The key is used to bring the unit out of the AUTOLOCK condition when operating in the pH-AUTOLOCK or mV-AUTOLOCK mode. Press and hold this key for 5 seconds, the LCD will display the efficiency of the electrode.</p>

[Note: For accurate measurements, it is recommended that pH calibration is performed once a week and after replacing the electrode.]

C. pH Measurements

To take pH measurements, "STAND" and "SLOPE" icon must be on, indicating the unit is either dual-point or three-point calibrated and ready for measurements. If "STAND" and "SLOPE" flash, perform a pH calibration before taking measurements.

Measurement with an ATC/Temp probe in the pH

AUTOLOCK mode

1. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the unit. The "ATC" icon will light up.
2. Press "Mode" key until "pH" icon and "AUTO" icon light up.
3. Rinse the pH electrode and ATC/temp probe with distilled water and immerse in the sample to be measured. Remove any air bubbles trapped around the probe by shaking or stirring the probe.
4. Press the "Mea." key. The "WAIT" icon will start flashing. The unit is waiting for a stable reading. The display will track the pH value as sensed by the pH electrode and the ATC/Temp probe.
5. When the "WAIT" icon disappears, the reading is then "HOLD" and will not respond to further changes from the sample. The pH value shown is the pH value of the sample at the displayed sample temperature.
[Note: For samples that are inherently unstable, the unit will not AUTOLOCK. In these cases, use the pH NON-AUTOLOCK mode for measurements.]

Measurement with manual temperature

compensation in the pH-AUTOLOCK mode

1. Connect the pH electrode to the BNC connector of the unit. The "MAN" icon will lit up. Set unit to display the sample temperature by pressing the up and down keys (-10.0 to 120.0°C).

stabilize, then press "Slope" key to calibrate. Once the unit calibrates the third point and the unit will automatically exit the calibration mode. The three point calibration is complete.

6. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the three calibration buffers. After calibration, press and hold "Mea./Eff." key for about 5 seconds to display the new electrode efficiency.

Calibration with manual temperature compensation in the pH NON-AUTOLOCK mode

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. Connect the pH electrode to the BNC connector of the unit, "MAN" icon will light up. Press "Mode" key until "pH" icon is on. The "STAND" icon will flash.
3. Rinse the pH probes in distilled water and immerse it in the first buffer solution (either 7.00 or 6.86). Adjust the temperature reading to that of the first buffer using the **up** or **down** keys (0.0 to 60.0°C) before pressing the "Stand" key. Then press and hold "Stand" key for 5 seconds to calibrate. Once the unit calibrates the first point, the "SLOPE" icon will flash. The unit is ready to be sloped at the second buffer.
4. Rinse the pH probe in distilled water and immerse it in the second buffer solution (either 4.00/4.01 or 9.18/10.01), then press "Slope" key to calibrate. Once the unit calibrates the second point, the "SLOPE" icon will flash. The unit is ready to be sloped at the third buffer. **[Note: To exit the calibration mode at this time, press the "Mode" key. Dual point calibration is complete.]**
5. Rinse the pH probe in distilled water and immerse it in the third buffer solution (either 9.18/10.01 or 4.00/4.01), then press "Slope" key to calibrate. Once the unit calibrates the third point and the unit will automatically exit the calibration mode. The three point calibration is complete.
6. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the three calibration buffers. After calibration, press and hold "Mea./Eff." key for about 5 seconds to display the new electrode efficiency.

Operational Procedures

A. Buffer Set Selection

The **Model H10** meter has two buffer sets: 7.00, 4.01, 10.01pH and 6.86, 4.00, 9.18pH. The meter is factory pre-set at 7.00, 4.01 and 10.01pH. To change the buffer set, turn off the unit, then press and hold the "Stand" key while turning on the unit again. [Note: There is no need to repeat this procedure every time the unit is power up unless one decides to change the buffer settings.]

B. pH Calibration

The Model H10 uses 2-point or 3-point calibration. The first point must be 6.86/7.00, and the second point can either be 4.00/4.01 or 9.18 / 10.01.

Calibration with an ATC/Temp probe in the pH-

AUTOLOCK mode

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. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the unit: "ATC" icon will lit up. "pH" icon and "AUTO" icon light up. The "STAND" icon will flash.
3. Rinse the pH and ATC/Temp probes in distilled water and immerse them in the first buffer solution (either 7.00 or 6.86). Allow temperature reading to stabilize, then press and hold "Stand" key for 5 seconds to calibrate. The "WAIT" icon will flash until the unit detects a stable reading. Once the unit calibrates the first point, the "SLOPE" icon will flash. The unit is ready to be sloped in the second buffer.
4. Rinse the pH and ATC/Temp probe in distilled water and immerse them in the second buffer solution (either 4.00/4.01 or 9.18/10.01). Allow temperature reading to stabilize, then press "Slope" key to calibrate. The "WAIT" icon will flash until the unit detects a stable reading. Once the unit calibrates the second point, the "SLOPE" icon will flash. The unit is ready to be sloped at the third buffer.

[**Note:** To exit the calibration mode at this time, press the “Mode” key. Dual point calibration is complete.]

5. Rinse the pH and ATC/Temp probe in distilled water and immerse them in the third buffer solution (either 9.18/10.01 or 4.00/4.01). Allow temperature reading to stabilize, then press “Slope” key to calibrate. The “WAIT” icon will flash until the unit detects a stable reading. Once the unit calibrates the third point and the unit will automatically exit the calibration mode. The three point calibration is complete.
6. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the three calibration buffers. After calibration, press and hold “Mea./Eff.” key for about 5 seconds to display the new electrode efficiency.

Calibration with manual temperature compensation in the pH-AUTOLOCK mode

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. Connect the pH electrode to the BNC connector of the unit, “MAN” icon will light up. “pH” icon and “AUTO” icon lit up. The “STAND” icon will flash.
3. Rinse the pH probes in distilled water and immerse it in the first buffer solution (either 7.00 or 6.86). Adjust the temperature reading to that of the first buffer using the up or down keys (0.0 to 60.0°C) before pressing the “Stand” key. Then press and hold the “Stand” key for 5 seconds to calibrate. The “WAIT” icon will flash until the unit detects a stable reading. Once the unit calibrates the first point, the “SLOPE” icon will flash. The unit is ready to be sloped at the second buffer.
4. Rinse the pH probe in distilled water and immerse it in the second buffer solution (either 4.00/4.01 or 9.18/10.01), then press “Slope” key to calibrate. The “WAIT” icon will flash until the unit detects a stable reading. Once the unit calibrates the second point, the “SLOPE” icon will flash. The unit is ready to be sloped at the third buffer.

[**Note:** To exit the calibration mode at this time, press the “Mode” key. Dual point calibration is complete.]

5. Rinse the pH probe in distilled water and immerse it in the third buffer solution (either 9.18/10.01 or 4.00/4.01), then press “Slope” key to calibrate. The “WAIT” icon will flash until the unit detects a stable reading. Once the unit calibrates the third point and the unit will automatically exit the calibration mode. The three point calibration is complete.
6. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the three calibration buffers. After calibration, press and hold “Mea./Eff.” key for about 5 seconds to display the new electrode efficiency.

Calibration with an ATC/Temp probe in the pH NON-AUTOLOCK mode

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. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the unit: “ATC” icon will light up. “pH” icon is on. The “STAND” icon will flash.
3. Rinse the pH and ATC/Temp probes in distilled water and immerse them in the first buffer solution (either 7.00 or 6.86). Allow temperature reading to stabilize, then press and hold “Stand” key for 5 seconds to calibrate. Once the unit calibrates the first point, the “SLOPE” icon will flash. The unit is ready to be sloped at the second buffer.
4. Rinse the pH and ATC/Temp probe in distilled water and immerse them in the second buffer solution (either 4.00/4.01 or 9.18/10.01). Allow temperature reading to stabilize, then press “Slope” key to calibrate. Once the unit calibrates the second point, the “SLOPE” icon will flash. The unit is ready to be sloped at the third buffer. [Note: To exit the calibration mode at this time, press the “Mode” key. Dual point calibration is complete.]
5. Rinse the pH and ATC/Temp probe in distilled water and immerse them in the third buffer solution (either 9.18/10.01 or 4.00/4.01). Allow temperature reading to