Operation Manual

Hand-held pH/ORP/Temperature Meter

6010N

CONTENTS

GENERAL INTRODUCTION

Thank you for selecting the 6010N meter. The 6010N is a precision tool that measure pH, ORP 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 unit has a waterproof IP65 case. The touch mode keys are highly reliable with tactile and audio feedback. This meter can operated with one 9V battery, typical battery life is 1000 hours. Re-calibration is not required when power is turned on again.

The front of the meter has a large LCD that displays pH or ORP 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 ORP 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 6010N can also be used in non-AUTOLOCK mode.

The model 6010N 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 **Jenco** representative immediately. All packing materials should be saved until satisfactory operation is confirmed.

WATER PROOF

Though the 6010N 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 steps1 and 2, call JENCO for possible repair or replacement (see Warranty).

INSTALLING THE BATTERIES

The 6010N meter is packaged with one 9V battery required for operation. To insert the batteries into the meter, follow the procedure outlined below.

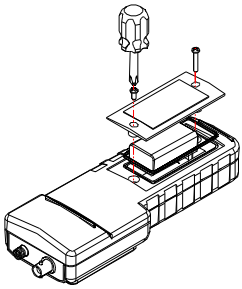


Figure 1: Battery compartment

1. Use a screw driver to remove the two screws and battery cover to expose the battery compartment. (Figure 1.)

2. Replace the 9V battery.

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 30 minutes of no key activity.]

DISPLAY & KEYS FUNCTIONS

A. Display

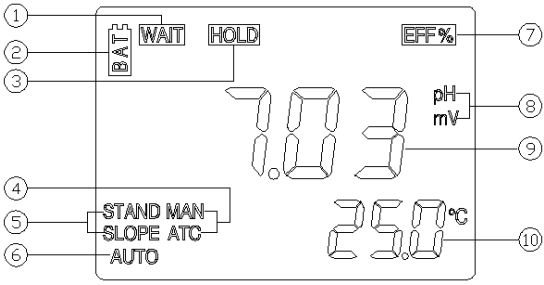


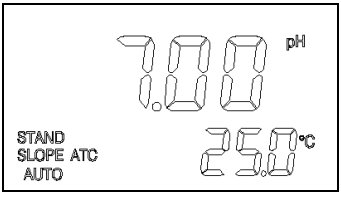
Figure 2: Active LCD screen

1. **WAIT-** This will be displayed when the unit is still waiting for a stable reading or end point sensing.	6. **AUTO-** AUTOLOCK mode indicator.
2. **BAT-** Low battery indicator.	7. **EFF(%)-** This will be displayed if the user is viewing the efficiency of the electrode.
3. **HOLD-** This will indicate that the reading is frozen during AUTOLOCK mode.	8. **pH/mV-** Unit and mode indicators.
4. **ATC/MAN-** ATC indicator will be displayed if a temperature probe is connected otherwise the MAN indicator will be displayed.	9. Main display for pH, mV and probe efficiency values
5. **STAND/SLOPE-** This indicator will flash if the STAND or SLOPE is not yet calibrated. This indicator will remain lit-up if the STAND and SLOPE have been calibrated .	10. Temperature and unit display

B. Keys

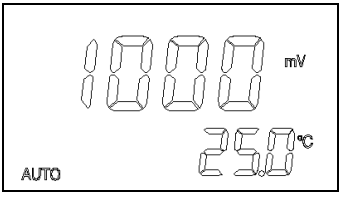
ON / OFF	**ON/OFF-** Powers on and shuts off the meter.
MODE	**MODE-** Selects display mode. Pressing this key changes the display sequentially to display pH-AUTOLOCK, mV-AUTOLOCK, pH and mV interface.
^ / v	**UP/DOWN-** The two keys are used to manually enter the temperature values. They have no effect on the unit when operating in ATC mode.
STAND SLOPE	**STAND/SLOPE-** The "STAND" and "SLOPE" keys are used for dual 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.
MEA. / EFF.	**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.
CLEAR	**CLEAR-** It is used to clear the unit when error signal appears. It clears all calibration values stored in the internal memory. In the pH-AUTOLOCK, mV-AUTOLOCK, pH and mV modes, press and hold this key for 5 seconds to enter the stand/slope calibration mode.

MODES OF THE METER



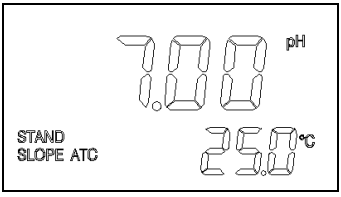
1. **pH-AUTOLOCK mode:**

The unit will display pH and temperature with both the "pH" and the "AUTOLOCK" icons on. The "WAIT" icon flashes until the unit detects a stable reading.



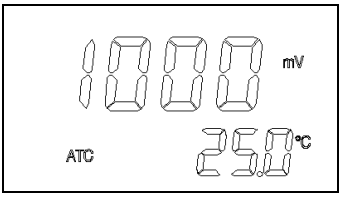
2. **mV- AUTOLOCK mode:**

The unit will display mV and temperature with both the "mV" and the "AUTOLOCK" icons on. The "WAIT" icon flashes until the unit detects a stable reading.



3. **pH mode:**

The unit will display pH and temperature readings with the "pH" icon on but "AUTOLOCK" icon off.



4. **mV mode:**

The unit will display mV and temperature readings with the "mV" icon on but "AUTOLOCK" icon off.

OPERATIONAL PROCEDURES

A. Buffer Set Selection

The 6010N 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 6010N uses 2-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.

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

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

1. Turn the unit on. Press “CLEAR” key for 5 seconds, all LCD elements will lit up. The meter clears all calibration values stored in the 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 will lit 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 2 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 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 and the unit will automatically exit the calibration mode. Dual point calibration is complete.

5. The unit calculates and compensates for the pH electrode SLOPE deviation corresponding to the values of the two calibration buffers. After calibration, press and hold “MEA./EFF.” key for 5 seconds to display the new electrode efficiency.

   [**Note:** It is recommended to use a new electrode when the efficiency value is over than 75%.]

b. Calibration with manual temperature compensation in the pH-AUTOLOCK mode.

1. Turn the unit on. Press “CLEAR” key for 5 seconds, all LCD elements will lit up. The meter clears all calibration values stored in the internal memory.

2. Connect the pH electrode to the BNC connector of the unit, “MAN” icon will lit up. “pH” icon and “AUTO” icon will 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℃) before pressing “STAND” key. Then press and hold “STAND” key for 2 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 and the unit will automatically exit the calibration mode. Dual point calibration is complete.

5. The unit calculates and compensates for the pH electrode SLOPE deviation corresponding to the values of the two calibration buffers. After calibration, press and hold “MEA./EFF.” key for 5 seconds to display the new electrode efficiency.

   [**Note:** It is recommended to use a new electrode when the efficiency value is over than 75%.]

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

1. Turn the unit on. Press “CLEAR” key for 5 seconds, all LCD elements will lit up. The meter clears all calibration values stored in the 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 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 2 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 and the unit will automatically exit the calibration mode. Dual point calibration is complete.

5. The unit calculates and compensates for the pH electrode SLOPE deviation corresponding to the values of the two calibration buffers. After calibration, press and hold “MEA./EFF.” key for 5 seconds to display the new electrode efficiency.

   [**Note:** It is recommended to use a new electrode when the efficiency value is over than 75%.]

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

1. Turn the unit on. Press “CLEAR” key for 5 seconds, all LCD elements will lit up. The meter clears all calibration values stored in the internal memory.

2. Connect the pH electrode to the BNC connector of the unit, “MAN” icon will lit 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℃) before pressing “STAND” key. Then press and hold “STAND” key for 2 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 and the unit will automatically exit the calibration mode. Dual point calibration is complete.

5. The unit calculates and compensates for the pH electrode

SLOPE deviation corresponding to the values of the two calibration buffers. After calibration, press and hold "MEA./EFF." key for 5 seconds to display the new electrode efficiency.

[**Note:** It is recommended to use a new electrode when the efficiency value is over than 75%.]

C. pH Measurements

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

a. 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 lit up.

2. Press "MODE" key until "pH" icon and "AUTO" icon lit up.

3. Rinse the pH electrode and ATC/temp probe with distilled water and immerse them in the sample to be measured. Remove any air bubbles trapped around the probe by shaking or stirring the probe.

4. Press the "MEA./EFF." key. The "WAIT" icon will start flashing. The unit is waiting for a stable reading. The meter will track the pH value as sensed by the pH electrode and the ATC/Temp probe.

5. When the "WAIT" icon disappears and the "HOLD" icon is displayed, the reading is then locked 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 this case, use the pH NON- AUTOLOCK mode for measurements.]

b. 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℃).

2. Press “MODE” key until “pH” icon and “AUTO” icon lit up.

3. Rinse the pH electrode probe with distilled water and immerse it in the sample to be measured. Remove any air bubbles trapped around the probe by shaking or stirring the probe.

4. Press the “MEA./EFF.” key. The “WAIT” icon will start flashing. The unit is waiting for a stable reading. The meter will track the pH value as sensed by the pH electrode probe.

5. When the “WAIT” icon disappears and the “HOLD” icon is displayed, the reading is then locked 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 unit will not AUTOLOCK. In this case, use the pH NON- AUTOLOCK mode for measurements.]

c. Measurement with an ATC/Temp probe in the pH NON-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 lit up.

2. Press “MODE” key until “pH” icon lit up.

3. Rinse the pH electrode and ATC/temp probe with distilled water and immerse them in the sample to be measured.

4. Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample at the displayed sample temperature.

d. Measurement with manual temperature compensation in the pH NON-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℃).

2. Press “MODE” key until “pH” icon lit up.

3. Rinse the pH electrode probe with distilled water and immerse in the sample to be measured.

4. Allow sufficient time for the display to stabilize. The instrument will display the pH value of the sample at the set sample temperature.

D. Temperature Measure

The 6010N 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

a. Measurement in the mV-AUTOLOCK mode.

1. Connect the 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./EFF.” key. The “WAIT” icon will start flashing. The unit is waiting for a stable reading. The meter will track the mV value as sensed by the ORP electrode.

5. When the “WAIT” icon disappears and the “HOLD” icon is displayed, the reading is then locked 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 mV NON- AUTOLOCK mode for measurements.]

b. Measurement in the mV NON-AUTOLOCK mode.

1. Connect the combination ORP electrode to the BNC connector of the unit.

2. Press “MODE” key until “mV” icon lit 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.

pH BUFFERS

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

℃	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

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

ERROR DISPLAYS AND TROUBLESHOOTING

Main Display	Possible cause(s)	Corrective Action(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, 9.18 and 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" / "undr"	1. Measured pH is out of the –2.00 to 16.00 pH range.	1. Bring sample pH into the correct measuring range.
	2. Measured mV is out of the –1999 to 1999 mV range.	2. Bring sample ORP into the correct measuring range.
	3. Measured temperature is out of the –10.0 to 120.0°C range.	3. Bring sample temperature into the correct measuring range.

[Note: If the meter still does not perform normally after the above measures are taken, call **Jenco** Service Department.**]**

SPECIFICATIONS

Display	Range	Resolution	Accuracy
pH	-2.00 to 16.00 pH	0.01 pH	±0.01±1digit
mV	-1999 to 1999 mV	1 mV	±0.1%
Temperature	-10.0 to 120.0 °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	$>10^{12}\Omega$
Temperature sensor	Thermistor, 10 kΩ at 25°C
Power	9Volt battery
Battery Life	~1000 Hours
Calibration Back-up	EEPROM
Automatic shut off function	30 minutes of non-use
Audio Feedback	All Touch Keys
End Point Sensing & Hold	Yes
Display (pH / mV : Temp)	12mm : 8mm high LCD
Ambient Temperature Range	0 to 50 °C
Relative Humidity	At 90% RH
Case	IP65 waterproof
Dimensions (W x D x H)	70mm x 198mm x 37mm
Weight	260 grams (Batteries included)

WARRANTY

Jenco warrants this product to be free from significant deviations in material and workmanship for a period of 1 year from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse, within the year period, please return-freight-prepaid and the correction of the defect will be made free of charge. If you purchased the item from our **Jenco** distributors and it is under warranty, please contact them to notify us of the situation. **Jenco** Service Department alone will determine if the product problem is due to deviations or customer misuse.

Out-of-warranty products will be repaired on a charge basis.

RETURN OF ITEMS

Authorization must be obtained from one of our representatives before returning items for any reason. When applying for authorization, have the model and serial number handy, including data regarding the reason for return. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. **Jenco** will not be responsible for damage resulting from careless or insufficient packing. A fee will be charged on all authorized returns.

NOTE: Jenco reserves the right to make improvements in design, construction and appearance of our products without notice.

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