

# Operating Instructions

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OAKTON ION 700

pH/ORP/ION/TEMP meter



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## GENERAL INTRODUCTION

Thank you for selecting the ION 700 meter. The ION 700 is a precision tool that measures pH, mV, ion concentration 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, offset and buffer solutions.

This meter has a waterproof IP54 case. The mechanical keys are highly reliable with tactile and audio feedback. It is powered by six AAA-size alkaline batteries or with a UL/CE approved AC adapter (OUTPUT:DC 9 V). 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 , mV , Rmv, ion and temperature measurements along with user prompts and mode indicators. The unit prompts the user through calibration and measurement procedures.

An AUTOLOCK feature for pH, mV (RmV) and ion 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, mV (Rmv), ion values, resulting in precise, repeatable and error-free measurements. The ION 700 can also be used in non-AUTOLOCK mode.

The model ION 700 is available with pH, ORP, ion and ATC (Automatic Temperature Compensation) probes. Other features include up to 5 point calibration for pH , 2 to 5 point calibration for ion, 1 point calibration for ORP, electrode offset recognition, electrode slope recognition, electrode efficiency display, built-in buffer coefficients, automatic or manual temperature compensation and 50/60 Hz AC noise rejection. This meter is user-friendly for laboratory application.

## INITIAL INSPECTION

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

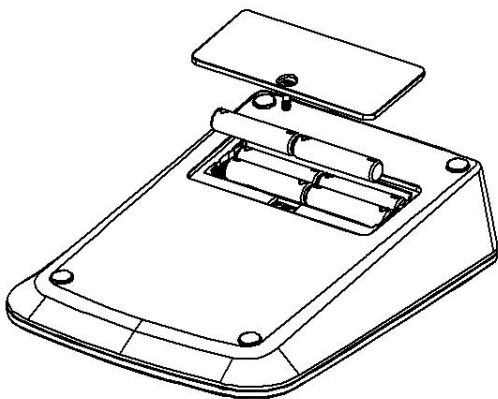
## POWER INPUT

The model ION 700 can be powered by an UL/CE approved 100 to 240 V AC adaptor as well as 6 “AAA” alkaline batteries. Check the label on the AC adaptor supplied with the meter to make sure that the AC line voltage is correct. If the wrong AC adaptor is supplied, notify your **Oakton** representative immediately.

## INSTALLING THE BATTERIES

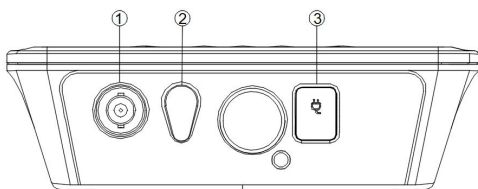
To insert the batteries into the meter, follow the procedure outlined below.

1. Use a Philip screw driver and unlock the battery cover by turning the screw driver in the counter clockwise direction. After unlocking the screw, take off the battery cover (Fig.1)
2. Replace the old batteries with new ones and install them in the correct polarity position.
3. Put the battery cover back on the meter. Use a Philip screw driver and turn the screw in the clockwise direction to lock the battery cover.



**Figure 1: Battery compartment**

## CONNECTORS

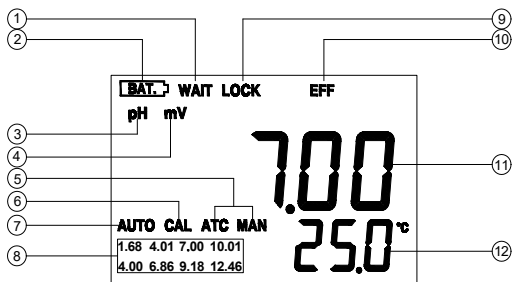


**Figure 2: Connectors**

1. pH/ORP/ISE connector (BNC connector)
2. ATC connector (2.5 mm phone jack)
3. AC adaptor input connector

## DISPLAY & KEYS FUNCTIONS

### A. Display



**Figure 3: Active LCD screen**

<p><b>1. WAIT-</b> This will be displayed when the unit is still waiting for a stable reading or end point sensing.</p>	<p><b>7. AUTO-</b> AUTOLOCK mode indicator.</p>
<p><b>2. BAT-</b> Low battery indicator.</p>	<p><b>8. Buffer selection-</b> This indicator will flash if the unit is not yet calibrated. This indicator will remain lit-up if the unit has been calibrated.</p>

3. <b>pH-</b> Unit and mode indicators.	9. <b>LOCK-</b> This will indicate that the reading is frozen during AUTOLOCK mode.
4. <b>mV (RmV)-</b> Unit and mode indicators.	10. <b>EFF-</b> This will be displayed if the user is viewing the efficiency of the electrode.
5. <b>ATC/MAN-</b> ATC indicator will be displayed if a temperature probe is connected otherwise the MAN indicator will be displayed.	11. <b>MAIN DISPLAY-</b> For pH, mV (RmV), ion and probe efficiency values
6. <b>CAL-</b> This will be displayed when the unit enters into the calibration mode.	12. <b>SECONDARY DISPLAY-</b> For temperature in °C.

## B. Operational keys description

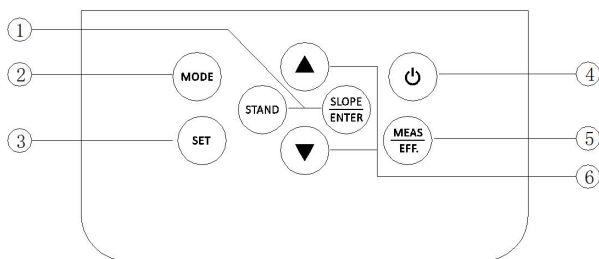










Figure 4

NO.	Key	Description
1	 	<b>STAND &amp; SLOPE/ENTER-</b> These two keys are used for pH, ORP and ion calibration. For their specific functions, please see the "calibration" section in each parameter. In the SET mode, the <b>"SLOPE/ENTER"</b> key is Used to save the corresponding parameter selected.

2		<p><b>MODE-</b> Select display mode. Pressing this key changes the display sequentially to display pH-AUTOLOCK, mV (RmV)-AUTOLOCK, ION-AUTOLOCK, pH, mV (RmV) and ion. The calibration values will not be affected by changing the display modes. In calibration mode, press <b>"MODE"</b> key to exit calibration mode.</p>
3		<p><b>SET-</b> In pH mode, press the <b>"SET"</b> key to enter the buffer set selection screen. In mV (Rmv) mode, press the <b>"SET"</b> key to enter the hold/clear selection . In ion mode, press the <b>"SET"</b> key to enter the calibration point selection mode.</p>
4		<p><b>On/Off-</b> Press and hold this key for 2 seconds to power on and shut off the meter.</p>
5		<p><b>MEAS/EFF.-</b> The key is used to bring the unit out of the AUTOLOCK condition when operating in the pH-AUTOLOCK, mV (RmV)-AUTOLOCK or ion-AUTOLOCK mode. In the pH or ion measure mode, press and hold this key for 5 seconds, the LCD will display the efficiency of the electrode and the offset value. In the ORP measure mode, press and hold this key for 5 seconds, the LCD will display the offset value of the electrode.</p>
6	  	<p><b>UP &amp; DOWN-</b> In the pH/ORP/ION measure mode, these two keys are used to manually enter the temperature values. They have no effect on the unit when operating in ATC mode. In the ORP calibration mode, these two keys are used to adjust the RmV display value. In the ion calibration mode, these two keys are used to select first point calibration value. In the SET mode, these two keys are used to choose the corresponding settings.</p>

## OPERATIONAL PROCEDURES

### A. pH Buffer Set Selection

The ION 700 meter has two buffer sets: 1.68, 7.00, 4.01, 10.01, 12.46 pH and 1.68, 6.86, 4.00, 9.18, 12.46 pH.

In pH mode, press **“SET”** to enter the buffer set selection mode. Use **“UP”** or **“DOWN”** to select the preferred buffer set. Press **“SLOPE/ENTER”** to save the selected buffer set.

[**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 ION 700 uses up to 5 point calibration.

[**Note:** If the device is required to perform more than one calibration points, the first calibration point must be 6.86/7.00 pH.]

1. **Calibration with an ATC/Temp probe in the pH-AUTOLOCK mode.**
  - a. Turn the unit on. In pH-AUTOLOCK mode, press **“SET”** to enter the buffer set selection mode. Use the **“UP”** or **“DOWN”** to select the preferred buffer set. Press **“SLOPE/ENTER”** to save the selected buffer set and enter into the hold/clear selection screen. Use **“UP”** or **“DOWN”** to select **“CLr”**. Press **“SLOPE/ENTER”**. The meter will clear all previously stored calibration values and is now ready for fresh calibration.
  - b. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the meter. The **“ATC”** icon will lit up. The **“pH”** and **“AUTO”** icons will also lit up. The **“CAL”** icon begins to flash. The meter is now ready for calibration.
  - c. Rinse the pH and ATC/Temp probes in distilled water and immerse them in the first buffer solution (to perform 2 to 5 point calibration, the first calibration point must be 6.86/7.00). Allow temperature reading to stabilize. Press and hold **“STAND”** for 2 seconds to start calibration. The **“WAIT”** icon will flash until the meter detects a stable reading. Once the meter calibrated the first point, the selected buffer icon will lit up while two other selectable

buffer icons start to flash. One point calibration is now complete. Press **"MODE"** to exit.

- d. To continue with the second point calibration, rinse the pH and ATC/Temp probe in distilled water and immerse them in the second buffer solution (either 4.00/4.01 pH or 9.18/10.01 pH corresponding to the flashing number on display). Allow temperature reading to stabilize. Press **"SLOPE/ENTER"**. The "WAIT" icon will flash until the meter detects a stable reading. Once the meter calibrated the second point, the selected icons of the two buffers lit up and the remaining buffer starts to flash. Dual point calibration is now complete. Press **"MODE"** to exit.
- e. To continue with the third, the fourth and the fifth point calibration, repeat step **d**. Press **"MODE"** to exit calibration mode when the desired calibration points are completed.
- f. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the calibrated buffers. After calibration, press and hold **"MEAS/EFF."** for about 5 seconds to display the new electrode efficiency and offset.

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

- a. Turn the unit on. In pH-AUTOLOCK mode, press **"SET"** to enter the buffer set selection mode. Use **"UP"** or **"DOWN"** to select the preferred buffer set. Press **"SLOPE/ENTER"** to save the selected buffer set and enter the hold/clear selection screen. Use **"UP"** or **"DOWN"** to select "CLr". Press **"SLOPE/ENTER"**. The meter will clear all previously stored calibration values and is now ready for fresh calibration.
- b. Connect the pH electrode to the BNC connector of the meter, the "MAN" icon will lit up. The "pH" and "AUTO" icons will also lit up. The "CAL" icon will begin to flash. The meter is now ready for calibration.
- c. Rinse the pH probes in distilled water and immerse it in the first buffer solution (to perform 2 to 5 point calibration, the first calibration point must be 6.86/7.00). Adjust the temperature reading to that of the first buffer using **"UP"** or **"DOWN"** (0.0 to 60.0 °C). Then press and hold **"STAND"** for 2 seconds to calibrate. The "WAIT" icon will flash until the unit detects a stable reading.

- d. Once the unit calibrated the first point, the selected buffer remains lit up while two other selectable buffers start to flash. One point calibration is now complete. Press **"MODE"** to exit.
  - e. Repeat steps **d** and **e** of **"Calibration with an ATC/Temp probe in the pH-AUTOLOCK mode"** for 2 to 5 point calibration. Press **"MODE"** to exit calibration mode when the desired calibration points are complete.
  - f. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the calibrated buffers. After calibration, press and hold **"MEAS/EFF."** for about 5 seconds to display the new electrode efficiency and offset.
- 3. Calibration with an ATC/Temp probe in the pH NON-AUTOLOCK mode.**
- a. Turn the unit on. In pH NON-AUTOLOCK mode, press **"SET"** to enter the buffer set selection mode. Use **"UP"** or **"DOWN"** to select the preferred buffer set. Press **"SLOPE/ENTER"** to save the selected buffer set and enter the hold/clear selection screen. Use the **"UP"** or **"DOWN"** to select **"CLR"**. Press **"SLOPE/ENTER"**. The meter will clear all previously stored calibration values and is now ready for fresh calibration.
  - b. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the meter. The **"ATC"** and **"pH"** icons will lit up. The **"CAL"** icon will begin to flash. The meter is now ready for calibration.
  - c. Rinse the pH and ATC/Temp probes in distilled water and immerse them in the first buffer solution (to perform 2 to 5 point calibration, the first calibration point must be 6.86/7.00). Allow temperature reading to stabilize. Press and hold **"STAND"** for 2 seconds. The unit immediately calibrates the first point. The selected buffer icon remains lit up while two other selectable buffer icons start to flash. One point calibration is now complete. Press **"MODE"** to exit.
  - d. To continue with the second point calibration, rinse the pH and ATC/Temp probe in distilled water and immerse them in the second buffer solution (either 4.00/4.01 pH or 9.18/10.01 pH corresponding to the flashing number on display). Allow temperature reading to stabilize. Press **"SLOPE/ENTER"**. The unit immediately calibrates the second point, The selected two buffers lit up and the remaining buffer icons start to flash. Dual point calibration is now complete. Press **"MODE"** to exit.

- e. To continue with the third, the fourth and the fifth point calibration, repeat step d. Press **"MODE"** to exit calibration mode when the desired calibration points are completed.
  - f. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the calibrated buffers. After calibration, press and hold **"MEAS/EFF."** for about 5 seconds to display the new electrode efficiency and offset.
4. **Calibration with manual temperature compensation in the pH NON-AUTOLOCK mode.**
- a. Turn the unit on. In pH-NON-AUTOLOCK mode, press **"SET"** to enter the buffer set selection screen. Use **"UP"** or **"DOWN"** to select the preferred buffer set. Press **"SLOPE/ENTER"** to save the selected buffer set and enter into the hold/clear selection screen. Use **"UP"** or **"DOWN"** to select **"CLR"**. Press **"SLOPE/ENTER"**. The meter will clear all previously stored calibration values and is now ready for fresh calibration.
  - b. Connect the pH electrode to the BNC connector of the unit, **"MAN"** and **"pH"** icons will lit up. The **"CAL"** icon will begin to flash. The meter is now ready for calibration.
  - c. Rinse the pH probes in distilled water and immerse it in the first buffer solution (to perform 2 to 5 point calibration, the first calibration point must be 6.86/7.00). Adjust the temperature reading to that of the first buffer using **"UP"** or **"DOWN"** (0.0 to 60.0 °C). Then press and hold **"STAND"** for 2 seconds to calibrate. The unit immediately calibrates the first point, The selected buffer icon remains lit up while the remaining buffer icons start to flash. One point calibration is now complete. Press **"MODE"** to exit.
  - d. Repeat steps d of **"Calibration with an ATC/Temp probe in the pH NON-AUTOLOCK mode"** for 2 to 5 point calibration. Press **"MODE"** to exit calibration mode when the desired calibration points are complete.
  - e. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the calibrated buffers. After calibration, press and hold **"MEAS/EFF."** for about 5 seconds to display the new electrode efficiency and offset.

## C. pH Measurements

To take pH measurements, ION 700 must be calibrated before first use.

### 1. **Measurement with an ATC/Temp probe in the pH-AUTOLOCK mode.**

- a. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the meter. The “ATC” icon will lit up.
- b. Press “**MODE**” until the “pH” and “AUTO” icons lit up.
- c. 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.
- d. Press the “**MEAS/EFF.**”. The “WAIT” icon will start to flash. 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.
- e. When the “WAIT” icon disappears, the reading is then “LOCK” 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.]

### 2. **Measurement with manual temperature compensation in the pH-AUTOLOCK mode.**

- a. Connect the pH electrode to the BNC connector of the meter. The “MAN” icon will lit up. Set unit to display the sample temperature by pressing “**UP**” or “**DOWN**” (0.0 to 100.0 °C).
- b. Repeat steps **b** to **e** of “**Measurement with an ATC/Temp probe in the pH- AUTOLOCK mode**”.

### 3. **Measurement with an ATC/Temp probe in the pH NON-AUTOLOCK mode.**

- a. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the meter. The “ATC” icon will lit up.

- b. Press **“MODE”** until **“pH”** icon lit up.
  - c. Rinse the pH electrode and ATC/Temp probe with distilled water and immerse in the sample to be measured.
  - d. Allow sufficient time for the display to stabilize. The meter will display the pH value of the sample at the displayed sample temperature.
4. **Measurement with manual temperature compensation in the pH NON-AUTOLOCK mode.**
    - a. Connect the pH electrode to the BNC connector of the meter. The **“MAN”** icon will lit up. Set meter to display the sample temperature by using **“UP”** or **“DOWN”** (0.0 to 100.0 °C).
    - b. Repeat steps **b** to **d** of **“Measurement with an ATC/Temp probe in the pH NON-AUTOLOCK mode”**.

#### **D. Temperature Measure**

The ION 700 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 Offset**

1. Turn the unit on. In mV (Rmv) mode. Press **“SET”** to enter the hold/clear selection screen. Use **“UP”** or **“DOWN”** to select **“CLr”**. Press **“SLOPE/ENTER”**. The meter will clear all previously stored calibration values and is now ready for fresh calibration.
2. Connect the ORP electrode to the BNC connector of the unit. The **“MAN”**, **“mV”** and **“AUTO”** icons will lit up.
3. Rinse the ORP probe in distilled water and immerse it in the standard solution. Then press and hold **“STAND”** for 2 seconds to calibrate. The **“CAL”** & **“RmV”** icons will lit up. According to the mV (RmV) value displayed, use the **“UP”** or **“DOWN”** keys to adjust the display value to the same value as the standard solution. Press **“SLOPE/ENTER”** to save and complete the calibration.

## F. mV (RmV) Measurements

### 1. Measurement in the mV (RmV)-AUTOLOCK mode.

- Connect the ORP electrode to the BNC connector of the unit.
- Press “**MODE**” until “mV” or “RmV” icon and “AUTO” icon lit up.
- Rinse electrode with distilled water and immerse it in sample to be measured.
- Press “**MEAS/EFF.**”. The “WAIT” icon will start to flash. The unit is waiting for a stable reading. The display will track the mV (Rmv) value as sensed by the ORP electrode.
- When the “WAIT” icon disappears, the reading is then “LOCK” and will not respond to further changes from the sample. The mV (RmV) value is the sample reading.

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

### 2. Measurement in the mV (RmV) NON-AUTOLOCK mode.

- Connect the ORP electrode to the BNC connector of the unit.
- Press “**MODE**” until “mV” or “RmV” icon lit up.
- Rinse electrode with distilled water and immerse it in sample to be measured.
- Allow sufficient time for the display to stabilize. The meter will display the mV (RmV) value of the sample.

## G. ION Calibration

The Ion 700 can measure ion concentration when using an ion selective electrode (ISE) for the specific ion of interest. The available ion calibration values are 0.10, 1.0, 10.0, 100.0, and 1000. Choose a minimum of 2 consecutive values for calibration and prepare the corresponding ion calibration solutions. For best results always begin with the lowest standard value, followed by the next lowest standard. The ION 700 uses 2 to 5 point calibration.

### 1. Calibration in the ION-AUTOLOCK mode.

- Turn the unit on. In ION-AUTOLOCK mode, press the “**SET**” to enter the calibration point selection screen. Use “**UP**” or

- “**DOWN**” to select 2 to 5 point calibration.
- b. Press “**SLOPE/ENTER**” to enter the monovalent ion/divalent ion selection screen. Use “**UP**” or “**DOWN**” to select.
  - c. Press “**SLOPE/ENTER**” to enter the hold/clear selection screen. Use “**UP**” or “**DOWN**” to select “CLr”. Press “**SLOPE/ENTER**”. The meter will clear all previously stored calibration values and is now ready for a fresh calibration.
  - d. Connect the ISE to the BNC connector of the meter. “MAN” and “AUTO” icons will lit up. The "CAL" icon will begin to flash.
  - e. Rinse the ISE in distilled water and immerse it in the first standard solution. Press and hold “**STAND**” for 2 seconds to calibrate. The “CAL” & “AUTO” icons will lit up. The main display will show “- - -”, the secondary display will show corresponding ion calibration value (0.10, 1.0, 10, 100) . Use “**UP**” or “**DOWN**” to select the first point calibration value.
  - f. Press “**SLOPE/ENTER**”. The mV value of the standard solution will appear on the main display. The “Wait” icon will flash until the meter detects a stable value. When the “Wait” icon disappears and the ion calibration value on the secondary screen moves up to the next value, the first point calibration is complete and the meter is ready for the second point calibration.
  - g. Rinse the ISE in distilled water and immerse it in the second standard solution. Press “**SLOPE/ENTER**”. The “Wait” icon will flash until the meter detects a stable reading. When the “Wait” icon disappears and the ion calibration value on the secondary screen moves up to the next value, the second point calibration is complete and the meter is ready for the third point calibration.
  - h. To continue with the third, the fourth and the fifth point calibration, repeat step g. Press “**MODE**” to exit calibration mode when the desired calibration points are completed.

[**Note:** The slope (mV difference between two consecutive points) is 15 to 90 mV.]

## 2. Calibration in the ION-NON-AUTOLOCK mode.

- a. Turn the unit on. In ION-NON-AUTOLOCK mode, press the “**SET**” to enter the calibration selection screen. Use “**UP**” or “**DOWN**” to select 2 to 5 point calibration.

- b. Press **“SLOPE/ENTER”** to save and enter the monovalent ion or divalent ion selection screen. Use **“UP”** or **“DOWN”** key to select.
- c. Press **“SLOPE/ENTER”** to enter the hold/clear selection screen. Use **“UP”** or **“DOWN”** to select **“CLr”**. The meter will clear all previously stored calibrated values and is now ready for fresh calibration.
- d. Connect the ISE to the BNC connector of the unit. The **“MAN”** icon will lit up. The **“CAL”** icon will begin to flash.
- e. Rinse the ISE in distilled water and immerse it in the first standard solution. Press and hold **“STAND”** for 2 seconds. The **“CAL”** icon will lit up. The main display will show **“- - - -”** and the secondary display will show corresponding ion calibration value (0.10, 1.0, 10, 100). Use **“UP”** or **“DOWN”** to select first point calibration value.
- f. Press **“SLOPE/ENTER”**. The mV value of the standard solution. When the mV value of the standard solution is stable, press **“SLOPE/ENTER”** to save. The ion calibration value on the secondary screen moves up to the next value. The first point calibration is complete and the meter is ready for the second point calibration.
- g. Rinse the ISE in distilled water and immerse it in the second standard solution. When the mV value of the standard solution is stable, press **“SLOPE/ENTER”** to save. The ion calibration value on the secondary screen moves up to the next value. The second point calibration is complete and the meter is ready for the third point calibration.
- h. To continue with the third, the fourth and the fifth point calibration, repeat step **g**. Press **“MODE”** to exit calibration mode when the desired calibration points are completed.

**[Note:** The slope (mV difference between two consecutive points) is 15 to 90 mV.]

## **H. ION Measurements**

### **1. Measurement in the ION-AUTOLOCK mode.**

- a. Connect the ISE to the BNC connector of the unit.
- b. Press **“MODE”** until **“AUTO”** and **“MAN”** icons lit up.
- c. Rinse electrode with distilled water and immerse it in sample to be measured.

- d. Press the “**MEAS/EFF.**”. The “**WAIT**” icon will start to flash. The unit is waiting for a stable reading. The display will track the ion value as sensed by the ion selective electrode.
- e. When the “**WAIT**” icon disappears, the reading is then “**LOCK**” and will not respond to further changes from the sample. The ion value is the sample reading.

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

## 2. Measurement in the ION NON-AUTOLOCK mode.

- a. Connect the optional combination ion selective electrode to the BNC connector of the unit.
- b. Press “**MODE**” until the “**MAN**” icon lit up.
- c. Rinse electrode with distilled water and immerse it in sample to be measured.
- d. Allow sufficient time for the display to stabilize. The meter will display the ion value of the sample.

## I. Ion Selective Electrodes

The table below lists the most common electrodes available.

Ammonia (NH <sub>3</sub> )	Iodide (I <sup>-</sup> )
Ammonium (NH <sub>4</sub> <sup>+</sup> )	Lead (Pb <sup>+2</sup> )
Bromide (Br)	Lithium (Li <sup>+</sup> )
Cadmium (Cd <sup>+2</sup> )	Nitrate (NO <sub>3</sub> <sup>-</sup> )
Calcium (Ca <sup>+2</sup> )	Nitrogen Oxide (NO <sub>x</sub> )
Carbon Dioxide (CO <sub>2</sub> )	Perchlorate (ClO <sub>4</sub> <sup>-</sup> )
Chloride (Cl <sup>-</sup> )	Potassium (K <sup>+</sup> )
Copper (Cu <sup>+2</sup> )	Silver / Sulfide (Ag <sup>+</sup> /S <sup>-2</sup> )
Cyanide (CN <sup>-</sup> )	Sodium (Na <sup>+</sup> )
Fluoride (F <sup>-</sup> )	Surfactant (X <sup>+</sup> , X <sup>-</sup> )
Fluoroborate (BF <sub>4</sub> <sup>-</sup> )	Water Hardness

## J. pH Buffers

The temperature coefficient of pH calibration buffers 1.68, 4.00, 4.01, 6.86, 7.00, 9.18, 10.01 and 12.46 pH are stored inside the meter. The buffers used to calibrate the meter must exhibit the same temperature characteristics as the stored values.

### Temperature coefficient of the pH buffers

°C	1.68	4.00	6.86	9.18	4.01	7.00	10.01	12.46
0	1.67	4.01	6.98	9.46	4.01	7.11	10.32	13.42
5	1.67	4.00	6.95	9.39	4.01	7.08	10.25	13.21
10	1.67	4.00	6.92	9.33	4.00	7.06	10.18	13.01
15	1.67	4.00	6.90	9.28	4.00	7.03	10.12	12.80
20	1.68	4.00	6.88	9.23	4.00	7.01	10.06	12.64
25	<b>1.68</b>	<b>4.00</b>	<b>6.86</b>	<b>9.18</b>	<b>4.01</b>	<b>7.00</b>	<b>10.01</b>	<b>12.46</b>
30	1.68	4.01	6.85	9.14	4.01	6.98	9.97	12.30
35	1.69	4.02	6.84	9.10	4.02	6.98	9.93	12.13
40	1.69	4.03	6.84	9.07	4.03	6.97	9.89	11.99
45	1.70	4.04	6.83	9.04	4.04	6.97	9.86	11.84
50	1.71	4.06	6.83	9.02	4.06	6.97	9.83	11.71
55	1.72	4.07	6.83	8.99	4.08	6.97	9.80	11.57
60	1.72	4.09	6.84	8.97	4.10	6.98	9.78	11.45

**[Note: The actual reading of the meter can differ from the values shown by  $\pm 0.01$  pH ]**

## ERROR DISPLAYS AND TROUBLESHOOTING

Main Display	Possible cause(s)	Corrective Action(s)
"Er1"	<ol style="list-style-type: none"> <li>1. <b>"STAND"</b> was pressed before the electrode and ATC/Temp probe settled to within +/-1.00 pH of the buffer value.</li> <li>2. pH electrode offset is greater/less than +/-1.00 pH.</li> <li>3. pH electrode is faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clearing the previous calibration data. Allow sufficient time for the electrode and ATC/Temp probe to stabilize, recalibrate meter.</li> <li>2. Replace the buffer and/or the pH electrode. Recalibrate meter.</li> <li>3. Replace electrode.</li> </ol>
"Er2"	<ol style="list-style-type: none"> <li>1. <b>"SLOPE/ENTER"</b> was pressed before the electrode and ATC/Temp probe settled to within 30% of the buffer value.</li> <li>2. Buffer 1.68, 4.00, 4.01, 9.18, 10.01 and 12.46 pH is not correct.</li> <li>3. pH electrode slope is off by more than 30% of ideal slope.</li> </ol>	<ol style="list-style-type: none"> <li>1. Allow sufficient time for the electrode and ATC/Temp probe to stabilize, re-press <b>"SLOPE/ENTER"</b> key to continue the calibration procedure.</li> <li>2. Check if the correct buffer is used.</li> <li>3. Clear the previous calibration data. Replace the buffer and/or the pH electrode. Recalibrate meter.</li> </ol>
"Er3"	In pH calibration mode, temperature is out of the 0.0 to 60.0 °C range.	Bring the pH buffer temperature within range.
"Er4"	In ion calibration mode, the slope (mV difference between two consecutive points) is out of the 15 to 90 mV range.	<ol style="list-style-type: none"> <li>1. Replace the standard solution and/or the ISE.</li> <li>2. Recalibrate meter.</li> </ol>
"Er5"	In ion calibration mode, the end user exited the calibration mode before completing the number of pre-selected calibration points .	Recalibrate meter.
"over"/ "undr"	<ol style="list-style-type: none"> <li>1. Measured pH is out of the -2.00 to 16.00 pH range.</li> <li>2. Measured mV (RmV) is out of the -1999.9 to 1999.9 mV range.</li> <li>3. Measured ion is out of the 0 to 2000 range.</li> <li>4. Measured temperature is out of the 0.0 to 100.0 °C range.</li> </ol>	<ol style="list-style-type: none"> <li>1. Bring sample pH into the correct measuring range.</li> <li>2. Bring sample ORP into the correct measuring range.</li> <li>3. Bring sample ion into the correct measuring range.</li> <li>4. Bring sample temperature into the correct measuring range.</li> </ol>

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

## SPECIFICATIONS

Display	Range	Resolution	Accuracy
pH	-2.00 to 16.00 pH	0.01 pH	±0.01 pH
mV (RmV)	-1999.9 to 1999.9 mV	0.1 mV	±0.05% F.S.
Ion	0.01 to 2000	0.01, 0.1, 1	±0.5% F.S. (mono-valent) ±1.0% F.S. (di-valent)
Temperature	0.0 to 100.0 °C	0.1 °C	±0.2 °C

<b>pH buffer recognition</b>	1.68, 7.00, 4.01, 10.01, 12.46 pH or 1.68, 6.86, 4.00, 9.18, 12.46 pH
<b>pH Temperature compensation</b>	AUTO/MAN 0.0 to 100.0 °C
<b>pH Buffer Temperature range</b>	0 to 60.0 °C
<b>pH calibration</b>	Up to 5 points
<b>ORP calibration</b>	1 point. Offset ±150 mV
<b>Ion calibration</b>	2 to 5 consecutive points, 0.1, 1.0, 10.0, 100.0 or 1000
<b>Input impedance</b>	> 3 x 10 <sup>12</sup> Ω
<b>Temperature sensor</b>	Thermistor, 30 kΩ at 25 °C
<b>Power</b>	6 X 1.5 V AAA Batteries or 100 to 240 V AC adapter
<b>Calibration Back-up</b>	EEPROM
<b>Audio Feedback</b>	All Touch Keys
<b>End Point Sensing &amp; Hold</b>	Yes
<b>Screen</b>	Segment LCD backlight
<b>Ambient Temperature Range</b>	0 to 50 °C
<b>Relative Humidity</b>	Up to 90%
<b>Case</b>	IP54
<b>Dimensions (W x D x H)</b>	150 x 210 x 45 mm
<b>Weight</b>	430 grams

## WARRANTY

Oakton Instruments warrants this product to be free from significant deviations in material and workmanship for a period of one year. If repair or adjustment is necessary and has not been the result of abuse or misuse, within the twelve month period, please return, freight-prepaid, and correction will be made without charge (see note on return of items). Oakton Instruments alone will determine if the product problem is due to deviations or customer misuse.

Out of warranty products will be repaired for a nominal charge.

## RETURN OF ITEMS

Authorization must be obtained from our Customer Service Department before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned. A restocking charge will be made on all unauthorized returns.

For your protection, items being returned must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Oakton Instruments will not be responsible for damage resulting from careless or insufficient packing.

**【 Note 】** : Oakton Instruments reserves the right to make improvements in design, construction and appearance of our products without notice.

**We stand behind our products. For additional information on our products, warranty, or returns please contact our office or visit our website listed on front page.**