Paul N. Gardner Company

USER MANUAL

Information and instructions for GARDCO distributed products.

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Operating Instructions

OAKTON pH 700

pH/ORP/TEMP meter



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GENERAL INTRODUCTION

Thank you for selecting the pH700 meter. The pH700 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, 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 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（RmV）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 pH700 can also be used in non-AUTOLOCK mode.

The model pH700 is available with pH, ORP and ATC (Automatic Temperature Compensation) probes. Other features include up to 5 point calibration for pH and 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 pH700 can be powered by an UL/CE approved 100 ~ 240 VAC adaptor as well as 6 “AAA” 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 **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 instrument. Use a Philip screw driver and turn the screw in the clockwise direction to lock the battery cover.

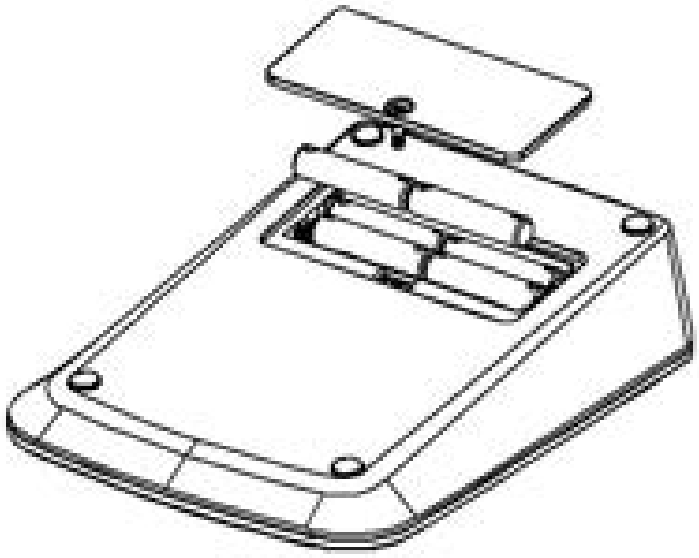


Figure 1: Battery compartment

DISPLAY & KEYS FUNCTIONS

A. Display

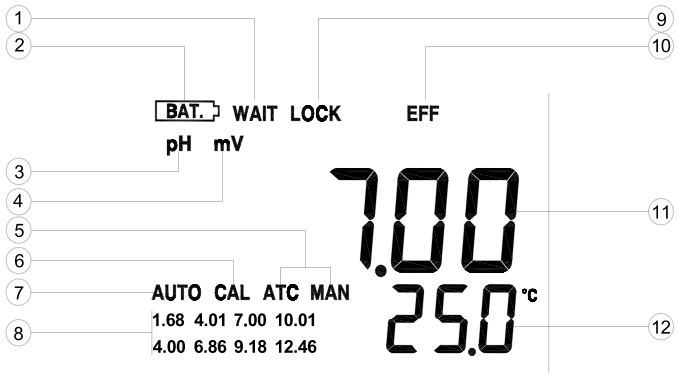


Figure2: Active LCD screen

1. **WAIT-** This will be displayed when the unit is still waiting for a stable reading or end point sensing.	7. **AUTO-** AUTOLOCK mode indicator.
2. **BAT-** Low battery indicator.	8. **Buffer selection-** This indicator will flash if the unit is not yet calibrated. This indicator will remain lit-up if the unit has been calibrated.
3. **pH-** Unit and mode indicators.	9. **LOCK-** This will indicate that the reading is frozen during AUTOLOCK mode.
4. **mV (RmV)-** Unit and mode indicators.	10. **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 over than 75%.
5. **ATC/MAN-** ATC indicator will be displayed if a temperature probe is connected otherwise the MAN indicator will be displayed.	11. **MAIN DISPLAY-** For pH, mV and probe efficiency values
6. **CAL-** This will be displayed when the unit enters into the calibration mode.	12. **SECONDARY DISPLAY-** For temperature in ℃.

B. Keys

	**On/Off-** Press and hold this key for 2 seconds to power on and shut off the meter.
	**Mode-** Selects display mode. Pressing this key changes the display sequentially to display pH-AUTO, mV (RmV)-AUTO, pH , mV (RmV). The calibration values will not be affected by changing the display modes. In **"calibration",** press "**Mode**" key to exit calibration mode.
	**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 5 seconds to prevent accidental erasing stored memory. In pH mode or mV (Rmv) mode, when the **"Clear"** key is pressed for 5 seconds, all segments of the LCD will be on. After 2 seconds the unit will enter the pH-AUTO mode or mV (Rmv)-AUTO mode. In the pH mode, the "AUTO" and "CAL" icons will be displayed and one of the buffer values in the pre-selected buffer set will begin to flash. This means that the unit is un-calibrated and requires new pH calibration before use. In the ORP mode, the "AUTO" and "mV" icons will be displayed. This means that the unit is un-calibrated and requires new ORP calibration before use.
 	**Up & Down-** In the pH/ORP 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.
 	**Stand & Slope-** These two keys are used for pH and ORP calibration. For their specific functions, please see the "calibration" section in each parameter.

Mea. / Eff.	**Mea. / Eff.-** 1. The key is used to bring the unit out of the AUTOLOCK condition when operating in the pH-AUTOLOCK or mV (RmV) - AUTOLOCK mode. 2. In the pH measure mode, press and hold this key for 5 seconds, the LCD will display the efficiency of the electrode and the offset value. 3. In the ORP measure mode, press and hold this key for 5 seconds, the LCD will display the offset value of the electrode.

OPERATIONAL PROCEDURES

A. pH Buffer Set Selection

The pH700 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.

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 pH700 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.]

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

1. Turn the unit on. In pH mode, press **"Clear"** key for 5 seconds, all LCD elements will lit 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 will lit up. The "CAL" icon begins to flash.

3. Rinse the pH and ATC/Temp probes in distilled water and immerse them in the first buffer solution. 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 selected buffer will lit up while two other selectable buffers start to flash. The unit is ready to be sloped at the

second buffer.

[**Note:** If the first buffer solution is 7.00 or 6.86 pH, at this moment, press the **"Mode"** key. The unit will exit the calibration mode. Single point calibration is complete.
If the first buffer solution is 1.68, 4.00, 4.01, 9.18 , 10.01 or 12.46 pH, at this moment, the unit will automatically exit the calibration mode. Single point calibration is complete.]

4. 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, 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 selected two buffers lit up and the remaining buffer starts to flash. The unit is ready to be sloped at the third buffer.

   [**Note:** At this moment, press the **"Mode"** key, the unit will exit the calibration mode. Dual point calibration is complete.]

5. The third point, the fourth point and the fifth point are the same as the second calibration point. When the unit completed the fifth point calibration, press the **"Mode"** key and exit calibration.

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

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

1. Turn the unit on. In pH mode, press **"Clear"** key for 5 seconds, all LCD elements will lit 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 lit up. "pH" icon and "AUTO" icon will lit up. The "CAL" icon will begin to flash.

3. Rinse the pH probes in distilled water and immerse it in the first buffer solution. Adjust the temperature reading to that of the first buffer using the **"Up"** or **"Down"** keys (0.0 ~ 60.0 ℃). Then press and hold **"Stand"** key for 2 seconds to calibrate. The "WAIT" icon will flash until the unit detects a stable reading.

4. Once the unit calibrates the first point, the selected buffer remains lit up while two other selectable buffers start to flash. The unit is ready to be sloped at the second buffer.

   [**Note:** If the first buffer solution is 7.00 or 6.86 pH, at this moment, press the **"Mode"** key, the unit will exit the calibration mode. Single point calibration is complete.
   If the first buffer solution is 1.68, 4.00, 4.01, 9.18, 10.01 or 12.46 pH, at this moment, the unit will automatically exit the calibration mode. Single point calibration is complete.]

5. Repeat steps 4 of "**Calibration with an ATC/Temp probe in the pH-AUTOLOCK mode"** for 2 to 5 point calibration.

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

1. Turn the unit on. In pH mode, press **"Clear"** key for 5 seconds, all LCD elements will lit 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. Press **"Mode"** key to select "pH" mode. "pH" icon is on. The "CAL" icon will begin to flash.

3. Rinse the pH and ATC/Temp probes in distilled water and immerse them in the first buffer solution. Allow temperature reading to stabilize, then press and hold **"Stand"** key for 2 seconds to calibrate, the unit immediately calibrates the first point, the selected buffer remains lit up while two other selectable buffers start to flash. The unit is ready to be sloped at the second buffer.

   [**Note:** If the first buffer solution is 7.00 or 6.86 pH, at this moment, press the **"Mode"** key, the unit will exit the calibration mode. Single point calibration is complete.
   If the first buffer solution is 1.68, 4.00, 4.01, 9.18, 10.01 or 12.46 pH, at this moment, the unit will automatically exit the calibration mode. Single point calibration is complete.]

4. 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, then press **"Slope"** key to calibrate. The unit immediately calibrates the second point, the selected two buffers lit up and the remaining buffer starts to flash. The unit is ready to be sloped at the third buffer.

   [**Note:** At this moment, press the **"Mode"** key, the unit will

exit the calibration mode. Dual point calibration is complete.]

5. The third point, the fourth point and the fifth point are the same as the second point calibration. When the unit completed the fifth calibration point, press the **"Mode"** key and exit calibration.

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

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

1. Turn the unit on. In pH mode, press **"Clear"** key for 5 seconds, all LCD elements will lit 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 lit up. Press **"Mode"** key to select "pH" mode. "pH" icon is on. The "CAL" icon will begin to flash.

3. Rinse the pH probes in distilled water and immerse it in the first buffer solution. Adjust the temperature reading to that of the first buffer using the **"Up"** or **"Down"** keys (0.0 ~ 60.0 ℃) before pressing **"Stand"** key. Then press and hold **"Stand"** key for 2 seconds to calibrate. The unit immediately calibrates the first point, the selected buffer remains lit up while the remaining buffers start to flash. The unit is ready to be sloped at the second buffer.

   [**Note:** If the first buffer solution is 7.00 or 6.86 pH, at this moment, press the **"Mode"** key, the unit will exit the calibration mode. Single point calibration is complete.
   If the first buffer solution is 1.68, 4.00, 4.01, 9.18, 10.01 or 12.46 pH, at this moment, the unit will automatically exit the calibration mode. Single point calibration is complete.]

4. Repeat steps 4 of "**Calibration with an ATC/Temp probe in the pH NON- AUTOLOCK mode"** for 2 to 5 point calibration.

C. pH Measurements

To take pH measurements, pH700 must be calibrated before first use.

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 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 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 “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.]

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 (0.0 ~ 100.0 ℃).

2. Repeat steps 2~5 of **“Measurement with an ATC/Temp probe in the pH- AUTOLOCK mode”.**

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 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 (0.0 ~ 100.0 ℃).

2. Repeat steps 2 ~ 4 of **“Measurement with an ATC/Temp probe in the pH NON- AUTOLOCK mode”.**

D. Temperature Measure

The pH700 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 mode, press **“Clear”** key for 5 seconds, all LCD elements will lit up. The meter clears all calibration values stored in internal memory.

2. Connect the ORP electrode to the BNC connector of the unit, “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”** key for 2 seconds to calibrate. The “CAL” & “RmV” icons will lit up. According to the mV (RmV) value displayed, press the **“Up”** and **“Down”** keys to adjust the display value to the same value as the standard solution. Press the **“Slope”** key to save and complete the calibration.

F. mV (RmV) Measurements

a. Measurement in the mV (RmV)-AUTOLOCK mode.

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

2. Press **“Mode”** key until “mV” or “RmV” 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 display will track the mV (Rmv) value as sensed by the ORP electrode.

5. 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.]

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

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

2. Press **“Mode”** key until “mV” or “RmV” 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 (RmV) value of the sample.

G. 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 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	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	**1.68**	**4.00**	**6.86**	**9.18**	**4.01**	**7.00**	**10.01**	**12.46**
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 instrument can differ from the values shown by ±0.01 pH **]**

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 +/-1.00 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 +/-1.00 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 1.68, 4.00, 4.01, 9.18, 10.01 and 12.46 pH 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"	In pH calibration mode, temperature is out of the 0.0 ~ 60.0 °C range.	Bring the pH buffer temperature within range.
"over"/ "undr"	1. Measured pH is out of the -2.00 ~ 16.00 pH range.	1. Bring sample pH into the correct measuring range.
	2. Measured mV (RmV) is out of the –1999.9 ~ 1999.9 mV range.	2. Bring sample ORP into the correct measuring range.
	3. Measured temperature is out of the 0.0 ~ 100.0 °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 **Oakton** representative.**]**

SPECIFICATIONS

Display	Range	Resolution	Accuracy
pH	-2.00 ~ 16.00 pH	0.01 pH	±0.01 pH
mV (RmV)	-1999.9 ~ 1999.9 mV	0.1 mV	±0.05% F.S.
Temperature	0.0 ~ 100.0 °C	0.1 °C	±0.2 °C

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