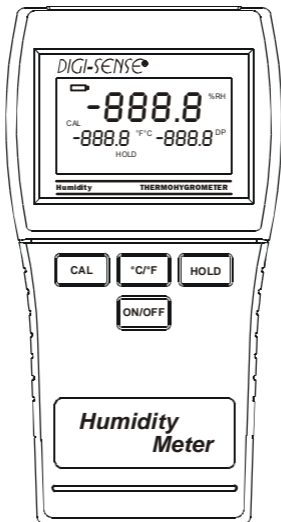


***Digi-SENSE***®

Humidity Meter  
MODEL NO. 60020-40



**OAKTON**®

**EUTECH  
INSTRUMENTS**

*Technology Made Easy...*

68X309920 Rev.0 06/04

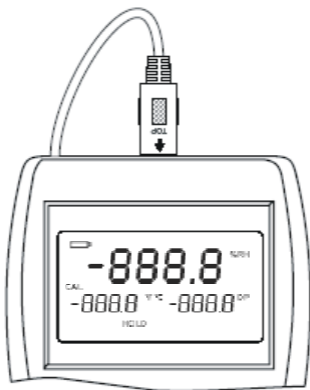
**ISO** 9001  
SUPPLIER CERTIFIED

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## INTRODUCTION

This versatile hand-held instrument provides highly accurate relative humidity and temperature measurements with calculated dew point in Fahrenheit or Celsius.



This instrument covers the extended measuring range of 0 to 100% RH,  $-40$  to  $+140^{\circ}\text{F}$  ( $-40$  to  $+60^{\circ}\text{C}$ ) temperature, and  $-130$  to  $+140^{\circ}\text{F}$  ( $-90$  to  $+60^{\circ}\text{C}$ ) for dew point.

The instrument is designed for easy operation and includes the following features:

- Operator selection of temperature scale
- Resolution of 0.1 (% RH,  $^{\circ}\text{F}$ ,  $^{\circ}\text{C}$ , and DP)
- LCD with three four-digit displays
- Five-pin circular DIN connector input for probe

- Hold feature for temporarily retaining a reading
- Two-point field calibration capability for humidity or temperature
- Low-battery warning
- Detachable and interchangeable humidity/temperature probe
- Built-in tilt stand for easy hands-free operation



CAUTION

## **SAFETY PRECAUTIONS**

DO NOT USE OR STORE THIS INSTRUMENT IN MICROWAVE OVENS OR ANY ABNORMALLY HOT OR COLD AREAS.



CAUTION WEAK BATTERIES SHOULD NOT BE LEFT IN THE INSTRUMENT. DEAD BATTERIES CAN LEAK AND CAUSE DAMAGE TO UNIT.

# SPECIFICATIONS

## HUMIDITY / TEMPERATURE PROBE

### Humidity:

**Type:** Capacitive sensor

**Range and Accuracy:**

Range	Accuracy
0% to 10%	±4% of reading
10% to 90%	±2% of reading
90% to 100%	±4% of reading

**Response Time:** 33% to 76% RH, still air at 25°C (77°F): 5 seconds

### Temperature

**Type:** Thermistor Element

**Range and Accuracy:**

Range	Accuracy
-40 to +60°C	±(0.2% of reading ±0.5°C)
-40 to +140°F	±(0.2% of reading ±0.9°F)

### Dew Point:

**Range:** -130°F to +140°F (-90°C to +60°C)

**Accuracy:** Accuracy of the calculated dew point depends on the accuracies of the measured temperature and humidity values. The following table reflects dew point accuracy given sensor measurement accuracies of ±0.5°C and ±2% RH.

Accuracy of Dew Point Temperature (±°C)											
% RH	Temperature (°C)										
	-40	-30	-20	-10	0	10	20	30	40	50	60
10	2.13	2.29	2.46	2.63	2.82	2.94	3.11	3.28	3.46	3.65	3.84
20	1.31	1.40	1.49	1.58	1.69	1.72	1.81	1.90	2.00	2.10	2.20
30	1.05	1.11	1.18	1.25	1.32	1.33	1.39	1.46	1.53	1.60	1.67
40	0.93	0.98	1.03	1.09	1.15	1.13	1.18	1.24	1.29	1.35	1.40
50	0.85	0.90	0.94	0.99	1.04	1.02	1.06	1.11	1.15	1.20	1.25
60	0.81	0.84	0.88	0.93	0.97	0.95	0.98	1.02	1.06	1.10	1.14
70	0.77	0.81	0.84	0.88	0.93	0.89	0.92	0.96	0.99	1.03	1.07
80	0.75	0.78	0.81	0.85	0.89	0.85	0.88	0.91	0.94	0.98	1.01
90	0.73	0.76	0.79	0.83	0.87	0.82	0.85	0.88	0.91	0.94	0.97
100	0.72	0.74	0.77	0.81	0.84	0.80	0.82	0.85	0.88	0.91	0.93

**Dimensions (L × W × H):**

8-3/8 in × 1-1/4 in × 1-3/4 in

(21.3 cm × 3.2 cm × 4.4 cm)

**Insertion Diameter: 0.65 in (1.64 cm) at 1.3 in (3.30 cm) depth**

Compatible with Calibration Salts

(See **ACCESSORIES** on inside back cover.)

**Cable Length:** 3 ft (91 cm)

**Weight:** 4 oz (114 g)

**Color:** Black

## HUMIDITY METER

**Relative Humidity Range:** 0 – 100%

**Accuracy for Humidity at 23°C:** +/- 2.0%

**Temperature Range:** –40 to +140°F (-40 to +60°C)

**Accuracy for Temp at 23°C:** +/- 0.9° F (+/- 0.5 °C)

**Display:** LCD with 0.4 in (10 mm) high characters main readout and 0.2 in (5 mm) high characters secondary displays, 4 digits each display plus various annunciators

**Display Update:** 0.6 seconds per update

**Connector:** Circular 6-pin DIN

**Battery Size:** Two AA, 1.5 V alkaline ANSI-L40, IEC-LR6

**Battery Life:** >200 hours continuous, typical

**Dimensions** (D × W × H):  
1.2 in × 3.3 in × 6.2 in (3 cm × 8.4 cm × 15.8 cm)

**Weight with Batteries:** 8 ounces (227 grams)

**Ingress Protection:** Meets IEC-60529 IP-54 for dust- and water-resistant enclosures.

**Compliance:** For CE Mark:  
EN61326-1/A1: 1998 (EU EMC Directive)

## METER AND PROBE OPERATING CONDITION

**Operating Temperature:** 32 to 104°F (0 to 40°C)

**Storage Temperature:** –40 to 149°F (–40 to 65°C)

**Humidity:** 10% to 90% (non-condensing)

**Altitude:** Up to 6560 ft (2000 m)

# BATTERY INSTALLATION AND REPLACEMENT

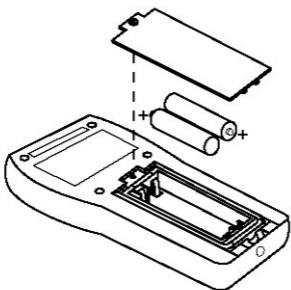


**CAUTION** WEAK BATTERIES SHOULD NOT BE LEFT IN THE INSTRUMENT. DEAD BATTERIES CAN LEAK AND CAUSE DAMAGE TO UNIT.

When battery indicator illuminates, battery life is approximately 8 to 10 hours. The battery indicator starts flashing when battery life is less than one hour. **At that point, the battery must be changed. If the battery charge gets too low, the display blanks leaving only the battery indicator.**

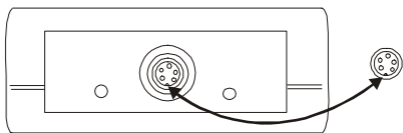
See **SPECIFICATIONS** for correct battery type.

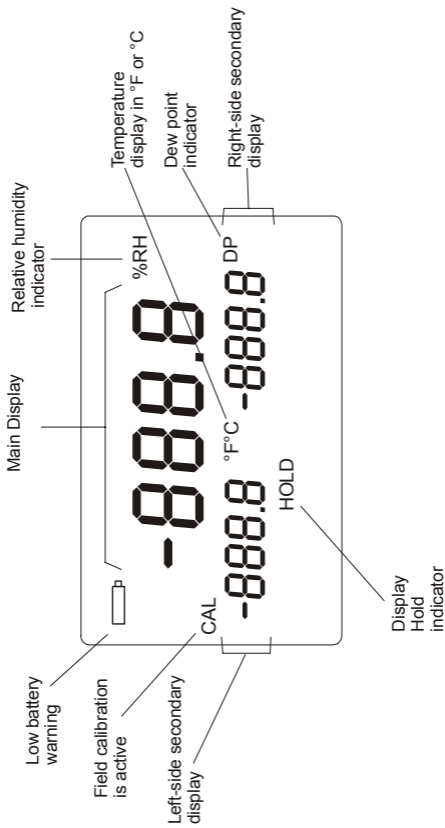
- 1) Before changing battery, turn instrument off and disconnect probe.
- 2) Loosen screw and lift battery cover off back of case.
- 3) Remove the two AA batteries.
- 4) Observe polarity, and insert two new batteries.
- 5) Install cover and tighten screw.



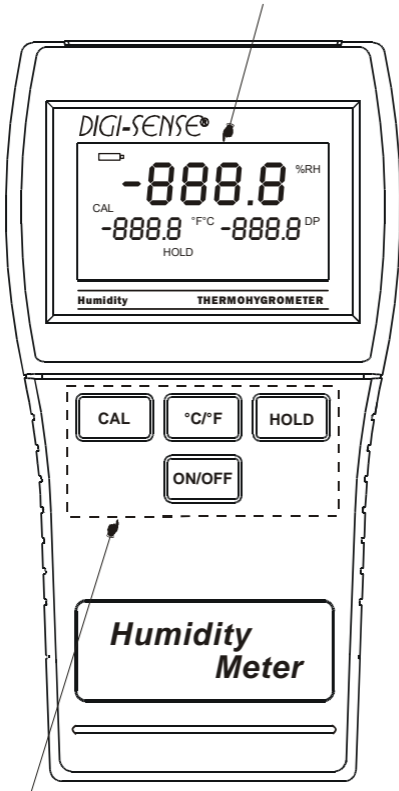
## CONNECTING THE PROBE

A five-pin socket is located at the top of the instrument. Align the slot locator in the plug of the probe with the slot in the socket as shown below. Insert the plug fully into the socket and turn the locking ring clockwise to secure the attachment.





DISPLAY (SEE PREVIOUS PAGE)



KEYPAD (SEE NEXT PAGE)

CAL

- Used for entering field calibration mode.
- When meter is in user calibration clear procedure, press to clear all user calibrations.
- In single point calibration procedures, press to store the calibration value.
- Used with °C/°F and **ON/OFF** for enabling field calibration lockout.

°C/°F

- Used for selecting °C or °F temperature scales.
- When meter is in any calibration procedures, press to scroll to calibration value.
- Used with **CAL** and **ON/OFF** for field calibration lockout.

HOLD

- Used for freezing reading in display. Press again to unfreeze.
- When meter is in dual point calibration procedures, press to store the calibration value
- Used with **ON/OFF** to enter the user calibration clear procedure
- Used with **CAL** and **ON/OFF** for disabling field calibration lockout

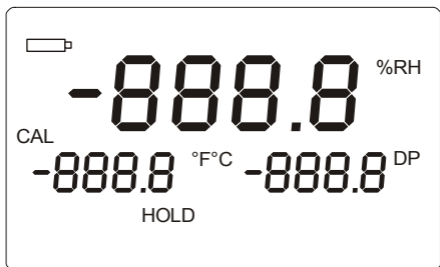
ON/OFF

- Used for powering up or turning off meter.
- Used with **HOLD** to enter the user calibration clear procedure
- Used with °C/°F and **CAL** for enabling field calibration lockout
- Used with **HOLD** and **CAL** for disabling field calibration lockout

## QUICK SETUP

NOTE: Review **SAFETY PRECAUTIONS**.

- 1) Install batteries.
- 2) Connect probe.
- 3) Press ON/OFF. The instrument performs a self-test and all display digits and indicators, as shown below, remain on for approximately one second.



## NOTE

If the probe has not been connected to the instrument, “**OPEN**” appears in the display.

“**OPEN**” also appears if the probe is not functioning. No measurements can be made while this message is displayed.



The image shows a digital display with three rows of text. The top row displays "OPEN" in large, bold, black characters, followed by "%RH" in smaller characters to the right. The middle row displays "OPEN" in large, bold, black characters, followed by "°F" in smaller characters to the right. The bottom row displays "OPEN" in large, bold, black characters, followed by "DP" in smaller characters to the right. The entire display is enclosed in a rounded rectangular border.

When a probe is connected, the meter will display “**Prob**” “**SEt**” “**UP**” momentarily before switching to the measurement mode.

## User Calibration Clear Procedure

With the instrument off, press and hold **HOLD**, then press and release **ON/OFF**.

Press **HOLD** until **CAL** annunciator and **CLr** is displayed before releasing the button.

To clear all user temperature and humidity calibrations, press **CAL** and display will show YES and exit to the measurement mode.

To exit to measurement mode without clearing any user calibrations, press **HOLD** and display will show NO before exiting to measurement mode.

# OPERATING PROCEDURES

## GENERAL

Reaching temperature equilibrium is essential when measuring humidity in calibration. Even a small temperature difference between the sensor and the measured object can cause an error. For example, at a temperature of +68°F (+20°C) with an RH of 50%, a difference of  $\pm 1^\circ\text{F}/\text{C}$  between the sensor and the measured object results in an error of  $\pm 3\%$  RH. For humidity of 90% RH, the resulting error is  $\pm 5.4\%$  RH.

There will be a greater error when there is high humidity and the sensor is warmer or colder than its surroundings. A difference in temperature of a few degrees can cause water to condense on the sensor's surface. Evaporation can take hours in an unventilated space; good ventilation accelerates evaporation. The humidity sensor resumes normal function as the water evaporates. Contaminated condensed water may shorten the life span of the sensor and change its calibration.

## OPERATION

The unit always powers up with the upper display showing humidity. If a probe is not connected at power up, the upper display indicates **OPEN**. For optimum operation, allow about one minute for ambient temperature stabilization. If the unit has been stored at an extreme ambient condition, more time may be needed.

## **BASIC MEASUREMENTS**

Check that the instrument is turned on, the probe is connected, and the desired temperature ( $^{\circ}\text{C}$  or  $^{\circ}\text{F}$ ) scales are selected. The upper display shows relative humidity and the lower display shows temperature and dew point.

## **SELECTING THE TEMPERATURE SCALE**

Use  $^{\circ}\text{C}/^{\circ}\text{F}$  for selection of the Celsius or Fahrenheit scale. The last selection is retained in memory even if the instrument is turned off.

## **HOLD FUNCTION**

Press **HOLD** to retain the reading on the display. Press **HOLD** again for normal operation.

## CALIBRATION

The calibration function allows both single-point and dual-point calibration of the instrument. Single-point calibrates the offset only. Dual-point calibrates the offset first then calibrates the slope.

Use the field calibration feature to improve instrument/probe accuracy or to compensate for probe calibration drift.

The instrument has a memory retention capability to hold calibration values even while the power is off or the batteries are removed.

When you restart, there is no need to recalibrate.

### SINGLE-POINT CALIBRATION PROCEDURES

#### Humidity and Temperature Calibration

- 1) Momentarily press **CAL** to enter the CALIBRATION mode. The CAL annunciator flashes. The relative humidity is displayed on the main display and "Lo" is displayed on the lower left display. "Lo" signifies the offset point.
- 2) Insert the probe into controlled humidity at the calibration point.
- 3) Allow the reading to stabilize. If the displayed humidity is higher or lower than the reference humidity, use **°C/°F** to scroll the displayed reading until the reference humidity is displayed. The calibration window limit is +/-5 % from the measured reading. **°C/°F** must be

pressed at least once. The CAL annunciator flashes during this procedure.

- 4) Press **CAL**. The main display shows temperature.
- 5) Insert the probe into controlled temperature at the calibration point.
- 6) Allow the reading to stabilize. If the displayed temperature is higher or lower than the reference temperature, use **°C/°F** to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 9^{\circ}\text{F}$  ( $\pm 5^{\circ}\text{C}$ ) from the measured reading. **°C/°F** must be pressed at least once. The CAL annunciator flashes during this procedure.
- 7) Press CAL to store the calibration.

### **Temperature Only Calibration**

- 1) Momentarily press **CAL** to enter the CALIBRATION mode. The CAL annunciator flashes. The relative humidity is displayed on the main display and **LO** is displayed on the lower left display signifying the offset point.
- 2) Press **CAL** again. The main display changes to temperature.
- 3) Insert the probe into controlled temperature at the calibration point.
- 4) Allow the reading to stabilize. If the displayed temperature is higher or lower than the reference temperature, use **°C/°F** to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 9^{\circ}\text{F}$  ( $\pm 5^{\circ}\text{C}$ ) from the measured reading. **°C/°F** must be pressed at least once. The

CAL annunciator flashes during this procedure.

- 5) Press CAL to store the calibration.

## **DUAL-POINT CALIBRATION PROCEDURES**

This calibration function provides both for offset and slope field calibrations. For proper calibration, the following conditions must be observed:

- The slope point must be a higher temperature or humidity than the offset point.
- The difference must be at least 36°F (20°C) or 20% RH.
- Use two points based on the expected high and low humidity and temperatures. Humidity and temperatures measured outside of these limits may no longer meet specifications.

### **Humidity and Temperature Calibration**

- 1) **Humidity Offset Calibration:** Momentarily press **CAL** to enter the CALIBRATION mode. The CAL annunciator flashes. The relative humidity is displayed on the main display and "Lo" is displayed on the lower left display. "Lo" signifies the offset point.
- 2) Insert the probe into controlled humidity at the lower calibration point.
- 3) Allow the reading to stabilize. If the displayed humidity and temperature are higher or lower than the reference temperature, use °C/°F to scroll the

displayed reading until the reference humidity and temperature are displayed. The calibration window limit is  $\pm 5\%$  from the measured reading.

**°C/°F** must be pressed at least once. The CAL annunciator flashes during this procedure.

- 4) Press **HOLD** to store the humidity offset calibration and advance to the slope calibration.
- 5) **Humidity Slope Calibration:** Place the probe at the higher reference humidity and temperature.
- 6) Allow the reading to stabilize. If the displayed humidity and temperature are higher or lower than the reference humidity and temperature, use **°C/°F** to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 5\%$  from the measured reading. **°C/°F** must be pressed at least once. The CAL annunciator flashes during this procedure.
- 7) Press **HOLD** to store the humidity calibration slope and proceed to the temperature calibration.
- 8) **Temperature Offset Calibration:** Insert the probe into controlled temperature at the lower calibration point.
- 9) Allow the reading to stabilize. If the displayed temperature is higher or lower than the reference temperature, use **°C/°F** to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 9^{\circ}\text{F}$  ( $\pm 5^{\circ}\text{C}$ ) from the measured reading. **°C/°F** must be pressed at least once. The

CAL annunciator flashes during this procedure.

- 10) Press **HOLD** to store the temperature offset calibration and advance to the slope calibration.
- 11) **Temperature Slope Calibration:** Place the probe at the higher reference temperature.
- 12) Allow the reading to stabilize. If the displayed temperature is higher or lower than the reference temperature, use **°C/°F** to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 9^{\circ}\text{F}$  ( $\pm 5^{\circ}\text{C}$ ) from the measured reading. **°C/°F** must be pressed at least once. The CAL annunciator flashes during this procedure.
- 13) Press **HOLD** to store the temperature calibration.

### **Temperature Only Calibration**

- 1) **Offset Calibration:** Momentarily press **CAL** to enter the CALIBRATION mode. The CAL annunciator flashes. The relative humidity is displayed on the main display and "Lo" is displayed on the lower left display. "Lo" signifies the offset point.
- 2) Press **CAL** again. The main display changes to temperature.
- 3) Insert the probe into controlled temperature at the lower calibration point.
- 4) Allow the reading to stabilize. If the displayed temperature is higher or lower than the reference temperature, use **°C/°F** to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 9^{\circ}\text{F}$

( $\pm 5$  °C) from the measured reading. °C/°F must be pressed at least once. The CAL annunciator flashes during this procedure.

- 5) Press **HOLD** to store the temperature offset calibration and advance to the slope calibration.
- 6) **Slope Calibration:** Place the probe at the higher reference temperature.
- 7) Allow the reading to stabilize. If the displayed temperature is higher or lower than the reference temperature, use °C/°F to scroll the displayed reading until the reference temperature is displayed. The calibration window limit is  $\pm 9$ °F ( $\pm 5$  °C) from the measured reading. °C/°F must be pressed at least once. The CAL annunciator flashes during this procedure.
- 8) Press **HOLD** to store the temperature slope calibration.

**Clearing Cal Point:** Switch off the instrument. Press and hold **HOLD**, and then switch the instrument on by pressing **ON/OFF**. Release **HOLD** once “**CAL**” annunciator and **CLr** are displayed. Clear all user calibrations by pressing **CAL**. The instrument reverts to the factory calibration with no offset or slope compensation.

## **FIELD CALIBRATION LOCKOUT AND RE-ENABLE**

The calibration lockout feature prevents any field calibration changes. The lockout remains in effect until a lockout re-enable has been performed. Use the following procedures to lockout or re-enable the field calibration operation.

### **Lockout Procedure**

- 1) Turn off the instrument.
- 2) Simultaneously press and hold **CAL** and **°C/°F**, and momentarily press **ON/OFF**. Continue to hold **CAL** and **°C/°F** until the display blanks.

### **Re-Enable Procedure**

- 1) Turn off the instrument.
- 2) Simultaneously press and hold **CAL** and **HOLD**, and momentarily press **ON/OFF**. Continue to hold **CAL** and **HOLD** until the display blanks.

## MAINTENANCE AND TROUBLESHOOTING

Properly used, the instrument should maintain calibration indefinitely and not require service other than occasional cleaning of the housing and changing of the batteries.

Do not clean with abrasives or solvents. Use mild detergents; never immerse nor use excessive fluid.

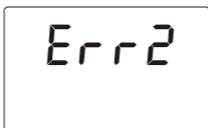
### BATTERIES

If there is no display when the instrument is turned on, check the condition of the two AA batteries. Check that the battery terminals are clean and batteries are properly installed. If replacement is necessary, refer to **BATTERY INSTALLATION AND REPLACEMENT** for the replacement procedure.

### SERVICE

There are no internal adjustments or user replaceable parts.

If “Err” followed by the numbers “1” through “9” is displayed (see example below), return unit for service. “Err” alone may be displayed during improper field calibration.



### NOTE

The serial number label is located inside the battery compartment.

## TROUBLESHOOTING

The following chart lists the most probable faults. There are no internal adjustments or user replaceable parts. If this does not solve the problem, refer service to your dealer.

<b>FAULT</b>	<b>ACTION</b>
No display when turned on	Check condition of batteries.
	Check that batteries are inserted properly.
Display shows - - - -	Out of range indication.
Display shows "OPEN"	Open probe connection
Display shows "Err"	If displayed at any time other than during field calibration, return instrument for service.

If "Err 1" through: Err 9" remains on the display, return instrument for service.

## ACCESSORIES

### Part Number

60020-40	Humidity Meter
60020-62	Replacement Relative Humidity probe
08520-05	Carrying case for meter

### Calibration Salts

37450-10	Calibration Kit with 11.3% and 75.3% RH salts
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### Calibration Services

17030-20	NIST-traceable calibration with test data after calibration at 30%, 60%, and 80% RH; 30°C (86°F)
----------	--

## WARRANTY

The Manufacturer warrants this product to be free from significant deviations from published specifications.

If repair or adjustment is necessary within the warranty period, the problem will be corrected at no charge if it is not due to misuse or abuse on your part as determined by the Manufacturer.

Repair costs outside the warranty period, or those resulting from product misuse or abuse, may be invoiced to you.

***This product comes with a 3-year meter warranty and 6-month Humidity / Temperature probe warranty.***

## PRODUCT RETURN

To limit charges and delays, contact the seller or Manufacturer for authorization and shipping instructions before returning the product, either within or outside of the warranty period. When returning the product, please state the reason for the return. For your protection, pack the product carefully and insure it against possible damage or loss. Any damages resulting from improper packaging are your responsibility.

## TECHNICAL ASSISTANCE

If you have any questions about the use of this product, contact the Manufacturer or authorized seller.

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For more information on Eutech Instruments/ OAKTON Instruments' products, contact your nearest distributor or visit our web site listed below:

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