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User's Guide

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# OS-DT8855W
## Non-Contact Infrared Thermometer

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## INTRODUCTION

Thank you for purchase of the OS-DT8855W IR Thermometer. This device offers non-contact (infrared) temperature measurement capability. The built-in laser circle and dot increases target accuracy while the backlight LCD and handy push-buttons combine for convenient, ergonomic operation. Type K thermocouple functionality is also built-in. Proper use and care of this meter will provide years of reliable service.

## FEATURES:

• Precise non-contact temperature measurement
• Type K temperature measurement
• Unique flat surface, modern housing design
• Built-in laser circle and dot
• Automatic data hold
• °C/°F switch
• Emissivity digitally adjustable from 0.10 to1.0
• MAX, MIN, DIF, AVG record
• Data Logger (LOG) with built-in memory storing up to 20 readings
• LCD with backlight
• Automatic range selection
• Resolution 0.1°C (0.1°F)
• Trigger lock

- High and low alarm
- Adjustable emissivity
- Wireless USB interface (RF 915MHz)
- Low battery indication
- 1 mV/°F analog output

## WIDE RANGE APPLICATION:

Food preparation, Safety and Fire Inspectors, Plastic Molding, Asphalt, Marine and Screen Printing, Measure Ink and Dryer Temperature, HVAC/R, Diesel and Fleet Maintenance.

# 1. ⚠ SAFETY

- Use extreme caution when the laser beam is turned on.
- Do not let the beam enter your eye, another person's eye or the eye of an animal.
- Be careful not to let the beam on a reflective surface strike your eye.
- Do not allow the laser light beam encroach on any gas which can explode.

**Distance and Spot Size**

As the distance (D) from the object increases, the spot size (S) of the area measured by the unit becomes larger. The relationship between distance and spot size for each unit is listed below. The focal point for each unit is 914mm (36"). The spot sizes indicate 90% encircled energy

Fig: 1



MODEL: OS-DT8855W   D:S=30:1

Distance(D) to Spot Size(S)

Laser Beam

inch   16mm

2.0@60

0.4@12   1.2@36

10@300   30@900

50@1500

mm

Sensor Beam
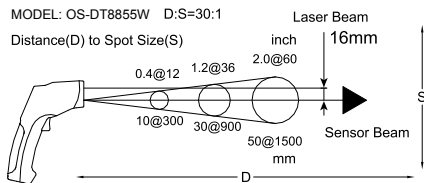
## 2. SPECIFICATIONS

| TK Measurement | TK Temperature Range | |
|---|---|---|
| | -50 to 1370°C (-58 to 2498°F) | |
| **Resolution** | -50 to 1370°C | 0.1°C |
| | -58 to 2498°F | 0.1°F |
| | 2000 to 2498°F | 1°F |
| **Accuracy** | -50 to 1000°C | ±1.5% of reading ±3°C (±5°F) |
| | 1000 to 1370°C | ±1.5% of reading ±2°C (±3.6°F) |

- 3 -

| IR Measurement | | |
|---|---|---|
| IR Temperature Range | | -50 to 1050°C (-58 to 1922°F) |
| D: S | | 30:1 |
| Resolution | | 0.1°C (0.1°F) |
| Accuracy | -50 to 20°C (-58 to -4°F) | ±5°C (9°F) |
| | -20 to 200°C (-4 to 392°F) | ±1.5% of reading ±2°C (±3.6°F) |
| | 200 to 538°C (392 to 1000°F) | ±2.0% of reading ±2°C (±3.6°F) |
| | 538 to 1050°C (1000 to 1922°F) | ±3.5% of reading ±5°C (±9°F) |

| | |
|---|---|
| Response time | less than 1 second |
| Spectral response | 8~14um |
| Emissivity | Digitally adjustable from 0.10 to 1.0 |
| Over range indication | LCD will show "-0L","0L" |
| Polarity | Automatic (no indication for positive polarity); Minus (-) sign for negative polarity |
| Diode laser | Output <1mW, Wavelength 630~670nm, Class 2(II) laser product |
| Operating temp. | 0 to 50°C (32 TO 122°F) |
| Storage temp. | -20 to 60°C (-4 TO 140°F) |
| Relative humidity | 10%~90%RH operating, <80%RH storage |
| Power  supply | 9V battery, NEDA 1604A or IEC 6LR61, or equivalent |

| Weight | 290 g (10.2 oz.) |
|---|---|
| Size | 100 x 56 x 230 mm (3.9 x 2.2 x 9.0") |
| Safety | "CE" Complies with EMC |

## Note:

• **Accuracy:** Given at 18 to 28°C (64 to 82°F), less than 80% RH

• **Field of View:** Make sure that the target is larger than the unit's spot size. The smaller the target, the closer you should be to it. When accuracy is critical, make sure the target is at least twice as large as the spot size.

## 3 FRONT PANEL DESCRIPTION

① IR sensor

② Circle/Dot laser switch

③ LCD display

④ Down button

⑤ Up button

⑥ Mode button

⑦ Laser/backlight button

⑧ Measurement trigger

⑨ Handle grip

⑩ Battery cover
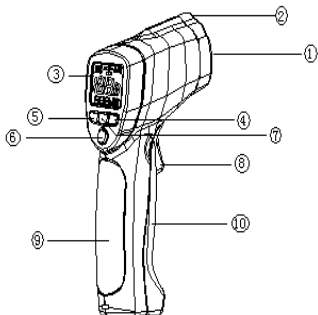
## 4 INDICATOR

① Data hold

② Measuring indication

③ Emissivity symbol and value

④ °C/°F symbol

⑤ Auto obtain emissivity

⑥ Lock and laser "ON" symbols

⑦ High alarm and low alarm symbols

⑧ Temperature values for the MAX, MIN, DIF, AVG, HAL, LOG, LAL, and TK.

⑨ Symbols for EMS, MAX, MIN, DIF, AVG, HAL, LAL, LOG, and TK

⑩ Current temperature value

⑪ Low battery
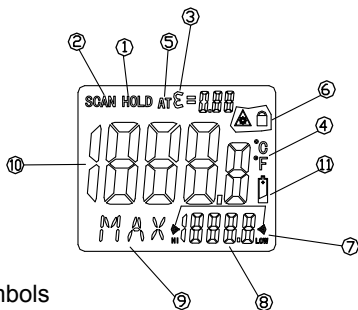
## 5 BUTTONS

① Up button (for EMS, HAL, LAL, LOG)

② MODE button (for cycling through the mode loop)

③ Down button (for EMS, HAL, LAL, LOG)

④ Laser/Backlight on/off button (pull trigger and press button to activate laser/backlight)

```
┌─ EMS
│    ▼
│   MAX
│    ▼
│   MIN
│    ▼
│   DIF
│    ▼        MODE
│   AVG
│    ▼
│   HAL
│    ▼
│   LAL
│    ▼
│   TK
│    ▼
│   LOG
│    ▼
└──────
```
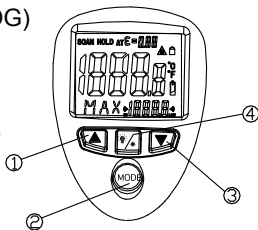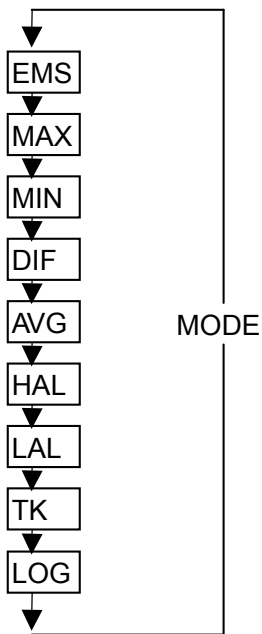
**MODE Button Function**
**Each time you take a reading the infrared thermometer measures Maximum (MAX), Minimum (MIN), Differential (DIF), and Average (AVG) Temp. This data is stored and can be recalled with the MODE button until a new measurement is taken. When the trigger is pulled again, the unit will begin measuring in the last mode selected. Pressing the MODE button also allows you to access the High Alarm (HAL), Low Alarm (LAL), Emissivity (EMS) and data logger (LOG). Each time you press the MODE button, you advance through the mode cycle. Pressing the MODE button also allows you to access the Type K temperature measurement. The diagram shows the sequence of functions in the MODE cycle.**

**Switching C/F , LOCK ON/OFF and SET ALARM.**

① **C/F**
② **LOCK ON/OFF**
③ **SET ALARM**
④ **LASER DOT/CIRCLE SWITCH**
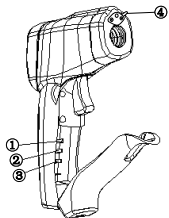
Select the temperature units ($^{o}$C or $^{o}$F)

by using the **$^{o}$C/$^{o}$F** switch

To lock the unit on for continuous measurement, slide the middle switch **LOCK ON/OFF** right. If the trigger is pulled while the unit is locked on, the laser and backlight will be turned on if they have been activated. When the unit is locked on, the backlight and laser will remain on unless it is turned off using the **Laser/Backlight** button on the keypad.

To activate the alarms, please slide the bottom switch **SET ALARM** right.

To set values for the High Alarm (**HAL**), Low Alarm (**LAL**) and Emissivity (**EMS**), active the display by pulling the trigger or pressing the **MODE** button, then press the **MODE** button until the appropriate code appears in the lower left corner of the display, then press the **UP** and **DOWN** buttons to adjust the desired values.

When the laser is on you can switch between laser dot and circle by moving a lever in front of the optics. The laser dot is an indication of the center of the field of view. Laser circle is an indication of the perimeter of the field of view.

## 6.   MEASURMENT OPERATION

① Hold the meter by its **Handle Grip** and point it toward the surface to be measured.

② Pull and hold the **Trigger** to turn the meter on and begin testing. The display will light if the battery is good. Replace the battery if the display does not light.

③ While measuring, the SCAN display icon will appear in the upper left corner of the LCD.

④ Release the Trigger and the HOLD icon will appear on the LCD indicating that the reading is being held.

⑤ The meter will automatically power off after approximately 7 seconds after the trigger is released. (Unless the unit is locked on)

## How to obtain Emissivity

In the EMS mode, press and hold the Laser/ Backlight button until the "EMS" icon on the left side of the LCD starts blinking. At this time, " $\varepsilon = --$ " will appear at the upper side of the LCD; IR temperature value will be in the middle of LCD; and Type K temperature value is at the lower side of the LCD. Make contact with the Type K probe to the object surface and test the temperature of same point with an IR measurement. After both values are stable, press the UP or DOWN button for confirmation, then the emissivity of the object will be shown at the upper side of the LCD. Press MODE button or trigger to enter normal measurement.

Note:

1. When the IR value is not corresponding to the TK value, or IR and TK tested at different points, no emissivity will be obtainable or a wrong emissivity will be obtained.

2. The temperature of the target should be higher than the ambient temperature. Normally, 100°C is suitable for obtaining a higher accuracy of emissivity.

After obtaining the emissivity, if the difference between IR value (in the middle of LCD) and TK value (at the lower side of LCD) is significant, the obtained emissivity will be incorrect. It's necessary then to obtain a new emissivity reading.

## Data Logger
### 1. Storing Data
The OS-DT8855W is capable of storing up to 20 data locations. The infrared temperature and temperatures scale (°C or °F) are also stored.
### 2. Infrared
To store data from an infrared reading, pull the trigger. While holding the trigger, press the MODE button until LOG appears in the lower left corner of the display; a log location number will be shown. If no temperature has been recorded in the shown LOG location, 4 dashes will appear in the lower right corner. Aim the unit at the target area you want to record, and press the laser/backlight button. The recorded temperature will appear in the lower right corner. To select another log location, press the up and down keys.

### 3. Recalling Data

To recall stored data after the unit shuts off, press the MODE button until LOG appears in the lower left corner. A LOG location number will be shown below LOG, and the stored temperature for that location will be displayed. To move to another LOG location, press the UP and Down keys.

### 4. Log Clear Function

The "Log clear" function allows you to quickly clear all logged data points. This function can only be used when the unit is in LOG mode. It can be used when the user has any number of LOG locations stored.

You should only use the LOG clear function when you want to clear all the data that is stored in the unit's memory. The "Log clear" function works as follows:

(1) While in LOG mode, press the trigger, then press the "down" arrow button until you reach LOG location "0".

**Note:** This can only be done when the trigger is pulled. LOG location "0" cannot be accessed by using the "up" arrow button.

(2) When LOG location "0" shows in the display, press the laser/backlight button. A tone will sound, and the LOG location will automatically change to "1" signifying that all the data locations have been cleared.

**5. Transmit the Data Logger**

You can transmit the stored temperature to your pc. This function can only be used when the unit is in LOG mode, and can transmit all of the stored temperatures one time. The function works as follows:

(1) While in LOG mode, press the trigger, and then press the "down" arrow button until LOG "TrM" is displayed.

(2) When LOG location "TrM" shows in the display, press laser/backlight button. A tone will sound and the LOG location will automatically change to "1". All of the stored temperatures are transmitted to your pc.
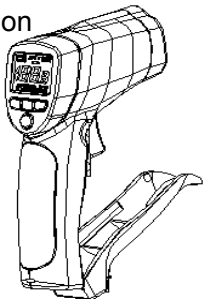
**Wireless Transmit Function**

1. In the MAX, MIN, DIF, AVG mode, press the USB button to activate the Wireless Transmit function, "USB" will be displayed on the upper right corner of the LCD. Press the USB button again to

turn off the function.

2. After the Wireless Transmit function is turned on, first connect the USB interface (RF915 MHz) to the computer and the wireless transmitter to the Thermometer, next press the "ON" button on the transmitter and open the OS-DT8855W software on the computer. The IR temperature readings on the Thermometer will now be transmitted to the computer.

3. Wireless Transmition is within a 15 m area. Note: Data will only be transmitted under SCAN state.

*Note: Measurement considerations*

*Holding the meter by its handle, point the IR Sensor toward the object whose temperature is to be measured. The meter automatically compensates for temperature deviations from ambient temperature. Keep in mind that it will take up to 30 minutes for the OS-DT8855W to adjust to wide ambient temperatures.*

## 7. Battery Replacement

① When battery power is not sufficient, LCD will display "⊟". Replacement with one new 9V battery is required.

② Open battery cover, then take out the battery from instrument and replace with a new 9-Volt battery and place the battery cover back.

## 8. General Information

● *How it Works*

Infrared thermometers measure the surface temperature of an object. The unit's optics sense emitted, reflected, and transmitted energy, which is collected and focused onto a detector. The unit's electronics translate the information into a temperature reading, which is display on the unit. In units with a laser, the laser is used for aiming purposes only.

● *Field of View*

Make sure that the target is larger than the unit's spot size. The smaller the target, the closer you should be to it. When accuracy is critical, make sure the target is at least twice as large as the spot size.
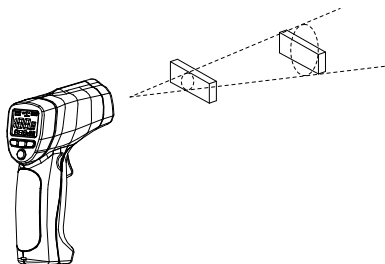
### *Distance & Spot Size*

As the distance (D) from the object increases, the spot size (S) of the area measured by the unit becomes larger. See **Fig: 1** .

● *Locating a hot Spot*

To find a hot spot aim the thermometer outside the area of interest, then scan across with an up and down motion until you locate the hot spot.

● *Reminders*

① OS-DT8855W is not recommended for use in measuring shiny or polished metal surfaces (stainless steel, aluminum, etc.). See **Emissivity Section.**

② OS-DT8855W cannot measure through transparent surfaces such as glass. It will measure the surface temperature of the glass instead.

③ Steam, dust, smoke, etc., can prevent accurate

measurement by obstructing the unit's optics.

● *Emissivity*

Emissivity is a term used to describe the energy-emitting characteristics of materials.

Most (90% of typical applications) organic materials and painted or oxidized surfaces have an emissivity of 0.95 (pre-set in the unit). Inaccurate readings will result from measuring shiny or polished metal surfaces. To compensate, cover the surface to be measured with masking tape or flat black paint. Allow time for the tape to reach the same temperature as the material underneath it. Measure the temperature of the tape or painted surface.

**Emissivity Values**

| Substance | Thermal emissivity | Substance | Thermal emissivity |
|-----------|--------------------|-----------|--------------------|
| Asphalt | 0.90 to 0.98 | Cloth (black) | 0.98 |
| Concrete | 0.94 | Human skin | 0.98 |
| Cement | 0.96 | Lather | 0.75 to 0.80 |
| Sand | 0.90 | Charcoal (powder) | 0.96 |
| Earth | 0.92 to 0.96 | Lacquer | 0.80 to 0.95 |

| Water | 0.92 to 0.96 | Lacquer (matt) | 0.97 |
|-------|--------------|----------------|------|
| Ice | 0.96 to 0.98 | Rubber (black) | 0.94 |
| Snow | 0.83 | Plastic | 0.85 to 0.95 |
| Glass | 0.90 to 0.95 | Timber | 0.90 |
| Ceramic | 0.90 to 0.94 | Paper | 0.70 to 0.94 |
| Marble | 0.94 | Chromium oxides | 0.81 |
| Plaster | 0.80 to 0.90 | Copper oxides | 0.78 |
| Mortar | 0.89 to 0.91 | Iron oxides | 0.78 to 0.82 |
| Brick | 0.93 to 0.96 | Textiles | 0.90 |

## 9. MAINTENANCE & CLEANING:

- Periodically wipe the case with a dry cloth. Don't use abrasives or solvents on this instrument.

## OS-DT8855W SOFTWARE VERSION 1.0
## Introduction

You OS-DT8855W Software is designed to receive, record and graphically present measurement data from an Infrared Thermometer Model OS-DT8855W with RF transmitter and receiver. Please read this file to assist you in understanding the software features.

## Compatibility

Hardware requirements: PC486 or better
Operating System: Microsoft Windows Version 98 or later versions.

Installation

1. The OS-DT8855W requires at least 2 megabytes of space for installation.
2. Install the software through standard Window's installation procedure:
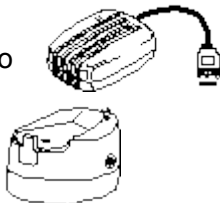
Insert the OS-DT8855W software CD into the CD-ROM drive.

Run the "setup.exe" setup program on the CD and the program will install to the folder selected.

## Software Operation
## Getting Started

1. Connect the RF receiver to the computer's USB port.
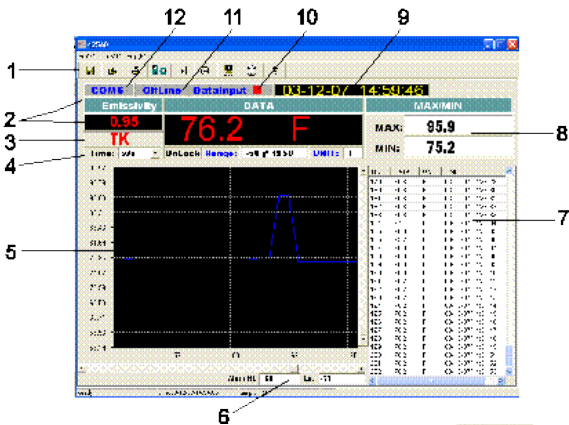2. Install the RF transmitter base onto the meter.

# Software Operation
## Getting Started
3. Run the OS-DT8855W program.
4. Main screen description:
   1. Control buttons:



| | | |
|---|---|---|
| **Save** | | **Undo Zoom** |
| **Open** | | **Clear Screen** |
| **Print** | | **Clear All** |
| **Select Com** | | **Help** |
| **On/Off** | | |

2. Emissivity setting

3.  MODE button selection
4.  **TIME:** sample rate;
    **UNLOCK/LOCK:** Status of test lock dip switch,
    **RANGE:** Temperature range of meter;
    **UNIT:** Temperature unit of measure
5.  Data graph display area
6.  High and Low Alarm limits
7.  Logged data list
8.  **MIN MAX** display values
9.  Date and Time (PC clock)
10. Each time a reading is logged the Data Input
    block changes color
11. **ONLINE, OFFLINE** status alert
12. Com port selection

## Establishing Communication

1.  Select the COM port the RF receiver is
    connected to using the 🖳 button.
    Note: Each time the button is pressed the com
    port number increases by one. Press SHIFT and
    the button to decrease the port number.
2.  Toggle the program to "OnLine" using the ▶
    button. If the "invalid port number" warning
    appears, select a different port and try again.
    HINT: In Windows XP the port can be identified
    by clicking; "start, Control Panel, System.
    Hardware, Device Manager, Ports (com & Lpt)"
    and observing which port the CP2101 to USB
    controller is on.

3. On the meter, press and hold the measurement trigger (or lock the meter ON using the LOCK switch).

4. On the meter, press the MODE button until one of the following appears in the lower left corner of the display; MAX/MIN/AVG/TK

5. On the meter, press the USB button until "USB" is indicated in the upper right corner of the meter's LCD display.

6. On the Transmitter base, press the ON button and communication will begin.

7. The display on the computer should now be the same as the reading on the meter and a date list and plot will be created at the programmed sample rate.

**Controls and Features**

**Time:** Set the sample rate time for plotting and listing measured data

**Alarm Hi and Lo:** These limits can be set in the text boxes and are displayed as green lines on the graph. Data points that exceed the set limits are plotted in red.

**ZOOM**: Left click and drag a rectangle to expand an area on the graph. Click on the $\ominus$ icon to return to full screen.

**Clear Screen:** Click the icon to clear the plotted data.

**Clear All Data:** Click the 🗑 icon to clear the plotted and listed data.

**Saving Files:** Click the 💾 icon to save a file. The file will be saved as a "AsmDat" file which can be recalled and opened in the program. The file will also be automatically saved as a text file with the data and time as the name (i.e. 07-03-14 12.57.45.txt). Use this file for export to standard spreadsheet or word processing programs.

**Opening Files:** Click the 📂 icon to open a saved file.

**Help:** Click the ❓ icon to open the Help document.

**ON/OFF:** Click the ▶ icon to start or stop communication. The DataInput block will blink red when communication has been established.

**Max Data Points:** The maximum number of data points allowed by the program is 4000. If 4000 data points is reached, a warning will appear stating the program must be restarted. Save or clear the data and restart.

**Plotting Characteristics:** The horizontal axis will automatically compress as the number of data points fill the original scale. If data logging is stopped and then started again, data will be appended to the existing plotted/listed data. Data should normally be saved and cleared before a new data logging session begins.

**Analog Output**

The output jack of the transmitter base provides a 1 MVdc per degree analog output. A mini plug cable connected to a banana plug pairs is supplied with the OS-DT8855W.

# WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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# RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,

2. Model and serial number of the product under warranty, and

3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,

2. Model and serial number of the product, and

3. Repair instructions and/or specific problems relative to the product.

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- ☞ Cartridge & Strip Heaters
- ☞ Immersion & Band Heaters
- ☞ Flexible Heaters
- ☞ Laboratory Heaters

## ENVIRONMENTAL MONITORING AND CONTROL

- ☞ Metering & Control Instrumentation
- ☞ Refractometers
- ☞ Pumps & Tubing
- ☞ Air, Soil & Water Monitors
- ☞ Industrial Water & Wastewater Treatment
- ☞ pH, Conductivity & Dissolved Oxygen Instruments