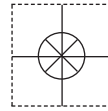


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# **CL1600-120VAC** **CL1600-240VAC** **Surface Probe Tester**



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It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, human applications.

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## Section 1 - Introduction

The CL1600 Surface Probe Tester is designed for ease of use and reliability whenever you have a need to test, check or confirm a reading from a surface probe under a set temperature.

It is important that you read this manual completely and follow all safety precautions before operating this instrument.

### 1.1 Precautions

To avoid personal injury, please follow all safety precautions and operating instructions outlined in this section.

- Caution! Do not touch the hot plate or its surrounding components at any time; the temperature on the hot plate is the same as the temperature indicated on the controller display. Please be careful.
- The CL1600 can operate at very high temperatures, when testing and handling surface sensors, they too will get very hot at the tip end, so be sure to have a heat resistant plate to place the sensors after testing and to allow them to cool down.
- Never turn the power off when the hot plate is set to temperatures higher than 100 degrees C. Damage to the electronic controller or to the heater could occur.
- Never leave your tester unattended when in use.
- Keep out of children reach.
- Never permanently place or attach any object within 6 inches of the plate.
- Do not operate in explosive environments.
- Never operate this unit with a power cord other than the one provided with this system.
- This instrument is intended for indoor use only.
- On initial use, or if this unit hasn't been power for a period of 10 days, it is recommended to turn the unit on and allow to run at 50 degrees C for 1 hour, before using at higher settings.
- Components and heater lifetime can be shortened by continuous high temperature use.
- Never place any foreign materials on the surface of the hot plate, fluids can leak into the electronic cabinet and into the heater assembly causing risk of injury and permanent damage to the tester.
- In the event this instrument blows a fuse, it could be due to a power surge or a component failure. Replace the fuses once, and then re-power the unit. If the fuses blow again, please contact Omega Engineering Customer Service at 1-800-622-2378 or 203-359-1660. We can also be reached on the Internet at [www.omega.com](http://www.omega.com), e-mail: [cservice@omega.com](mailto:cservice@omega.com)
- Always replace fuses with one of the same rating, voltage and type. For safety reasons; never replace a fuse with one of higher voltage value.
- The CL1600 Probe Tester was designed to be a precision instrument with durability, trouble free and ease of operation as our main goals; as such, this unit should not be operated in dirty, dusty, wet or oily environments.

**NOTE:**

There are no user serviceable parts inside your unit. Attempting to repair or service your unit may void your warranty.

## 1.2 Safety Warnings and IEC Symbols

This device is marked with international safety and hazard symbols in accordance with IEC 1010. It is important to read and follow all precautions and instructions in this manual before operating or commissioning this device as it contains important information relating to safety and EMC. Failure to follow all safety precautions may result in injury and or damage to your tester. Use of this device in a manner not specified by the manufacturer may impair protection provided within the unit.





IEC symbols	Description
	Caution, risk of electric shock
	Caution, refer to accompanying documents
	Caution, hot surface
	230 Vac @ 50 Hz (European Models) 115 Vac @ 60 Hz (Domestic Models)

Figure 1. IEC Symbols

## 1.3 Statement on CE Marking

It is the policy of OMEGA® to comply with all world-wide safety and EMI/EMC regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

## 1.4 General Description

Omega's CL1600 Surface Probe Tester is a system designed to check and verify surface probe readings across a wide range in temperatures, 25 to 450°C (77 to 842°F). The CL1600 allows periodic in-house testing and provides preventive maintenance for all your surface sensors.

A large diameter, mirror like, high grade Aluminum alloy Hotplate design, allows the most stability while maintaining quick, uniform heat-up on the entire system.

---

## Section 2 - Installation

### 2.1 Unpacking

Remove the packing list and verify that you have received all your equipment. If you have any questions about the shipment, please call our Customer Service Department at 1-800-622-2378 or 203-359-1660. We can also be reached on the Internet at [omega.com](http://omega.com) e-mail: [info@omega.com](mailto:info@omega.com)

When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

---

**NOTE:**

The carrier will not honor any damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

---

The following items are supplied in the box:

- CL1600 Surface Probe Tester (1)
- User's Manual (1)
- Calibration Certificate (1)
- Power Cord (1)
- RS232 Communications Cable (1)
- User Interface Software CD (1)

### 2.2 Mounting

Place this unit on a bench or table top in horizontal position. To operate, be sure to stay away from constantly open and close doors, air conditioning vents, adjacent computer fans, room air moving fans, open windows, etc.

### 2.3 Ambient Temperature

The CL1600 Probe Tester can generate any temperature within the specified temperature range when operated at ambient temperatures of 5 to 35°C (41 to 95°F).

## 2.4 Main Power Connection

Use provided power cord.

### NOTE:

All electrical connections and wiring should be performed by suitable trained personnel only.

## 2.5 Installing the CL1600 Programmer Software

### Overview

The CL1600 Surface Probe Tester ships from the factory with a copy of the Omega Programmer software.

This is an easy to use software package, especially written for the CL1600. Only one instrument can run this software in one computer at a time.

### Program Installation

It is advisable to have your IT Department install this software into your computer. Always back-up your system before attempting to install this or any other software package into your computer.

Assuming you have backed up your computer files, run the install program.

This program will run trouble free with Windows® 95, 98, ME, NT, 2000 or XP.

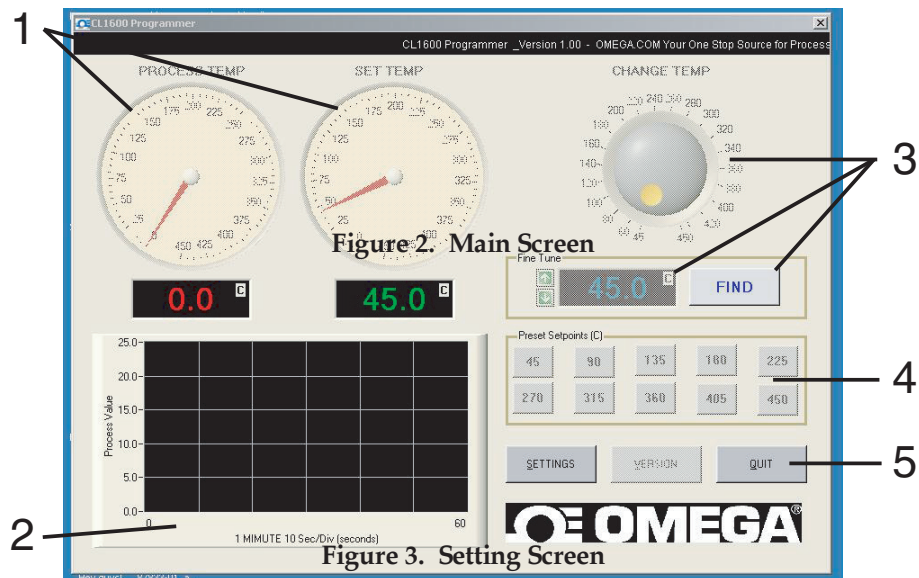
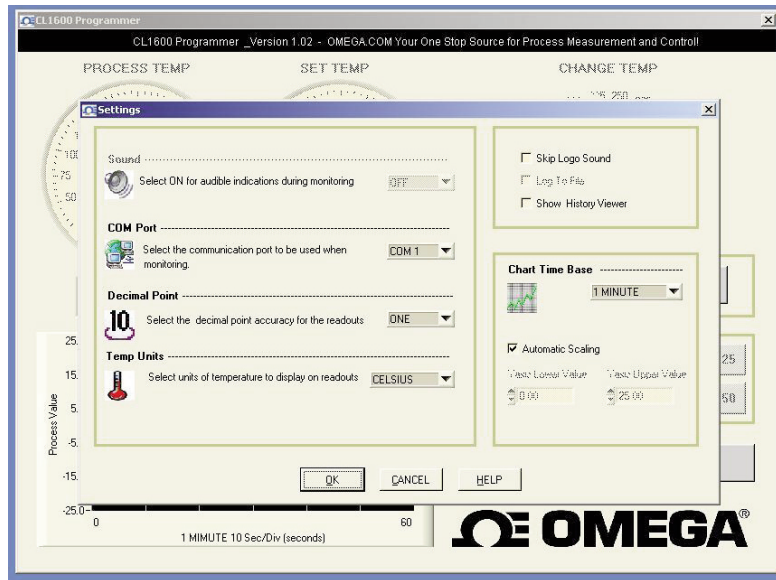


Figure 2. Main Screen





**Figure 3. Setting Screen**

On your desktop, double click the CL1600 programmer icon. This will open a window and the Omega Logo (see figure 2) appears for a few seconds, then the main screen opens.

1. On the main screen top left there are two analog gages and two digital display windows below, one is red to indicate process temperature, the other is green to indicate set point temperature.

2. Below, there is a graph which tracks the set point and process values.

The set point and process values are on the vertical axis, while the capture duration time is displayed along the horizontal axis.

3. On the top right the change temperature wheel will allow rough temperature setting between 45 to 450°C.

Below it there is a fine tune up and down arrow that allows for fine tune settings in increments of 0.1 degrees.

To the right there is the FIND button. Pressing this button will start tracking the set temperature on the controller.

4. The CL1600 programmer software includes 10 preset temperature settings ranging from 45 to 450°C.

5. SETTINGS: Pressing this button will bring a second screen into view (see figure 3).

**SOUND:** Will allow audible indications while monitoring.  
 Selections: ON, OFF  
 Default: OFF

**COM Port:** Selects the communication port to be used while monitoring.  
 Selections are: COM 1, COM 2, COM 3 or COM 4.  
 Default: COM1

**DECIMAL POINT:** Selects the decimal point accuracy for the readouts.  
 Selections: ONE, NONE  
 Default: ONE

TEMPERATURE UNITS: Selects units of temperature to display on readouts.

Selections: CELSIUS, FAHRENHEIT

Default: CELSIUS

SKIP LOGO INTRODUCTION: Selecting this box will cancel the logo introduction when the program is activated from your desktop.

LOG TO FILE: Selecting this box will allow data login  
This command is inactive at this time.

CHART TIME BASE: Allows user to set the horizontal time graph display

Selections are: 1 minute, 10 minutes and 1 hour

AUTOMATIC SCALING: Selecting this box will pre-select a vertical scale which varies according to temperature setting.

Un-selecting this box, will allow user to set up values to zoom-in closer to the desired temperature range.

## Section 3 - Operation

### 3.1 Front Panel Controls and Indicators

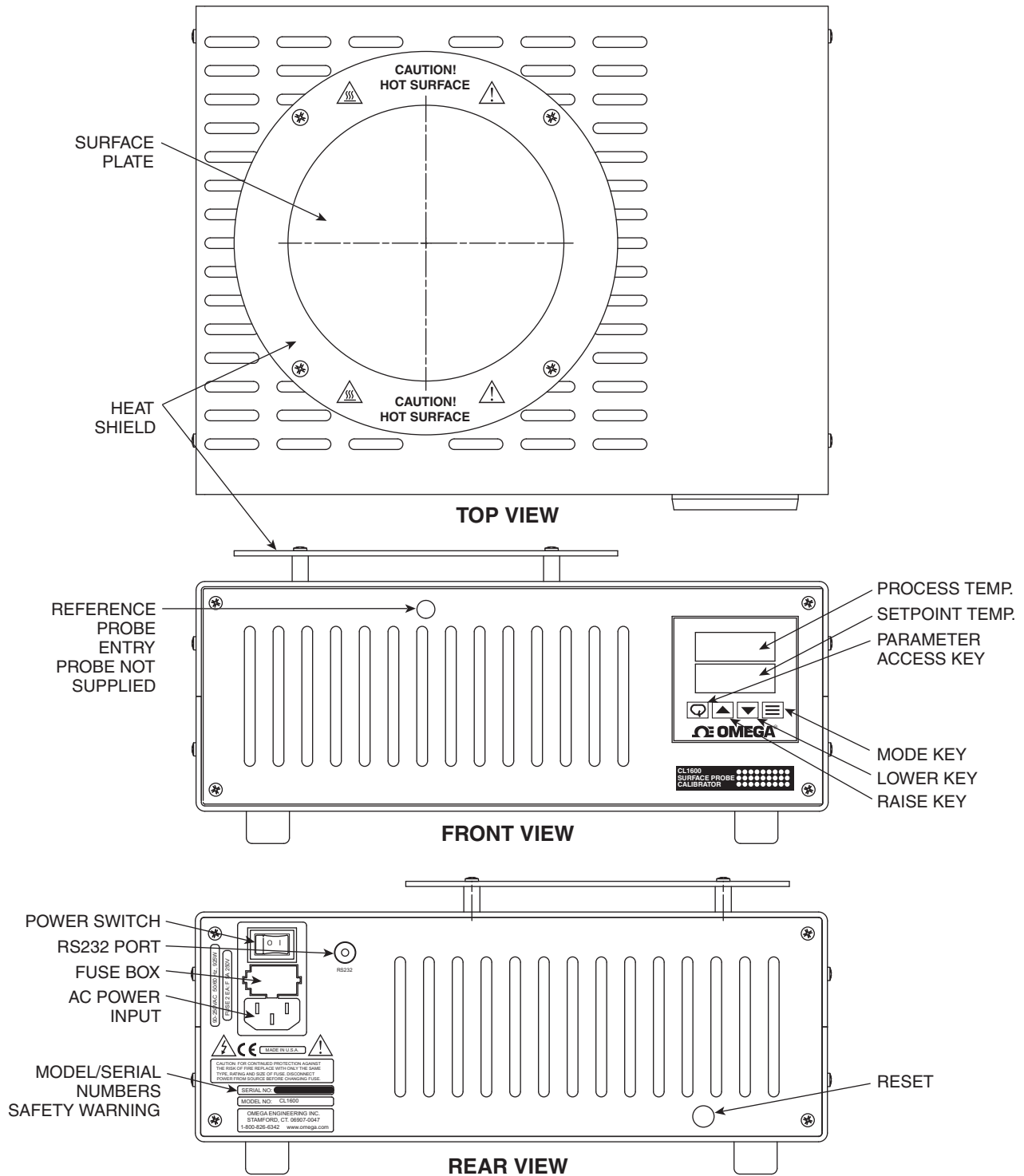


Figure 4. Front Panel Controls and Indicators

**NOTE:**

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**P.I.D. Control:**

Proportional, integral, derivative control ( P.I.D.) is a temperature control algorithm used in high-end temperature controllers. The controller causes the process to attain the desired temperature by turning the process on or off. The process may be a heater or refrigerator. As the process temperature approaches the setpoint temperature the hot or cold process will be pulsed to reduce the corrective measures and minimize overshooting. The controller provides a visual representation of the process status through LED indicators. An indicator may be lit continuously, blink or shut off entirely to indicate that the process is on, being pulsed, or off, respectively.

---



**Parameter/ Access Key: This key is inactive.**

Press to scroll through menu parameters



**Raise Key:**

Use to increase values (hold for fast-step progression).



**Lower Key:**

Use to decrease values (hold for fast-step progression).



**Mode Key: This key is inactive.**

Press to save settings and exit a menu level.

**Process Temperature:**

This field displays the current temperature of the target plate. (red display)

**Setpoint Temperature:**

The field displays the desired target temperature. Once the target plate reaches this desired temperature, both displays will read the same value. (green display)

**AC Power Input:**

The customer connects the power cord to the AC Power Input. As a safety precaution, the power cord cannot be connected if the fuse compartment is open. Refer to Section 5.3 for information on fuse replacement.

**Reference Probe Port:**

The reference probe port enables the user to monitor the target plate temperature with an external instrument.

**Serial Port:**

The female phone jack port allows the customer to make RS232 interface with the CL1600. A detailed description of this port is described in Section 4.

**3.2 Changing the Temperature Setpoint**

The internal parameters in the microprocessor have been set to be functional between 25 and 450°C (77 to 842°F).

**Manual Temperature Change**

To change the temperature set point to any value within the allowable range, use the up or down arrow keys as needed, holding the corresponding key down will allow fast-step progression.

**Automated Temperature Change**

The CL1600 includes a user interface computer program, which can be accessed and activated through the RS232 port. For a complete description of included features, please turn to section 2-5.

### 3.3 Heat-Up/Cool-Down Cycle Transition Times

The following table shows the amount of time required to change the target plate temperature from one setpoint to another. The starting temperature is shown along the left side. The final temperature is shown along the top. All transition times are approximate.

#### Heat Up Transition Time

FROM 25°C	TO					
	50°C	100°C	200°C	300°C	400°C	450°C
	2.0 min.	4.0 min.	2.0 min.	8.0 min.	11.0 min.	16.0 min.

Figure 5. Heat Up/ Cool Down Transition Time Table

#### Cool Down Transition Time

The CL1600 will take 90 minutes to cool down from 450°C. Be sure the unit has cooled down and it is safe to touch before handling the unit.

### Section 4 - RS232 Communication

The RS232 communications port allows bi-directional data transfer via a three conductor cable consisting of signal ground, receive input, and transmit output. **It is recommended that less than fifty feet of cable be used between the computer and this instrument.\*** Note that multiple instruments cannot be tied to the same port in this configuration. The RS232 port is optically isolated to eliminate ground loop problems.

Below is a pinout diagram for the serial port of the CL1600 as well as the pinout for a 9-pin PC serial port. The cable should be attached only when the computer and CL1600 are off.

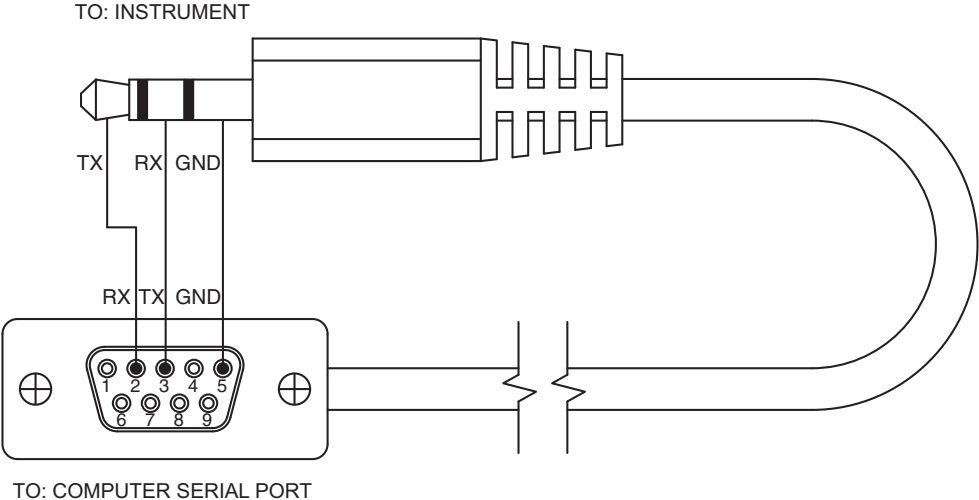


Figure 6. Pinout for a 9-pin PC Serial Port

## Section 5 - Maintenance

### 5.1 Calibration

This unit has been fine tuned at the factory and calibrated to give optimum performance of its full temperature range. It is recommended that the unit be returned annually for re-calibration. Please call our Customer Service Department at 1-800-622-2378 or 203-359-1660.

### 5.2 Cleaning

#### CAUTION:

Remove all electrical connections and power before attempting any cleaning.

#### 5.2.1 Main Body

Only a damp soft rag with a mild cleaning solution should be used to clean the main body of this unit.

#### 5.2.2 Target Plate

Do not attempt to clean the target plate. The target plate has a special coating applied and cleaning may change the performance of your unit.

### 5.3 Fuse Replacement

#### WARNING:

Disconnect all power from source before attempting fuse replacement.

#### CAUTION:

For continued protection against the risk of fire replace with only the same size, type and rating fuse indicated here and on the rear panel of your unit.

Model	Fuse
For Model CL1600-120V use	2 ea. 250 VAC, F3.15A (Fast Acting 3.15 amps) UL/CSA Approved (5 mm dia x 20 mm long)
For Model CL1600-240V use	2 ea. 250 VAC, F5A (Fast Acting 5 Amps) UL/CSA Approved (5 mm dia x 20 mm long)



## Section 6 - Troubleshooting Guide

Problem	Solution
1. Unit will not turn on.	<ul style="list-style-type: none"> <li>a. Check all electrical connections.</li> <li>b. Check rear panel fuses.</li> <li>c. Unit requires service, contact our customer service department.</li> </ul>
2. Unit turns on but the target plate will not get hot.	<ul style="list-style-type: none"> <li>a. Check that you have entered a setpoint above the ambient temperature.</li> <li>b. Verify that the controller is set to its factory default settings.</li> <li>c. Unit requires service, contact our customer service department.</li> <li>d. Press reset button on rear panel.</li> </ul>
3. Controller display shows "Error" and the target plate will not get hot or cold.	<ul style="list-style-type: none"> <li>a. Unit requires service, contact our customer service department.</li> </ul>
4 Target plate temperature will not stabilize to within $\pm .1^{\circ}\text{C}$ of the setpoint temperature.	<ul style="list-style-type: none"> <li>a. Verify that the controller is set to its factory default settings.</li> <li>b. Unit requires service, contact our customer service department.</li> </ul>
5. Unable to communicate with the unit through the RS232 connection port.	<ul style="list-style-type: none"> <li>a. Check that you have made the proper wiring connections between your unit and computer.</li> <li>b. Unit requires service, contact our customer service department.</li> </ul>

## Section 7 - Glossary of Terms Used in This Manual

### **Calibration**

The process of adjusting an instrument or compiling a deviation chart so that its reading can be correlated to the actual value being measured.

### **IEC**

International Electrotechnical Commission

### **PID**

Proportional, Integral, Derivative. A three mode control action where the controller has time proportioning, integral (auto reset) and derivative rate action.

### **RTD**

Resistance temperature detector

---

## Specifications: CL1600 Surface Probe Tester

<b>Target Plate:</b>	4.5" diameter
<b>Temperature Range:</b>	35 to 450°C
<b>Uniformity:</b>	±0.4 @ 100°C ±0.8 @ 200°C ±1.2 @ 300°C ±1.4 @ 400°C ±1.7 @ 450°C
<b>Heating Time:</b>	< 30 minutes from 25°C to 450°C
<b>Surface Plate:</b>	6061 Aluminum, with a surface finish of 0.0008 mm (0.000032")
<b>Cooling Time:</b>	90 minutes
<b>Stabilization Time:</b>	15 minutes
<b>Temperature Sensor:</b>	100 Ohms RTD
<b>Power</b>	
120 Vac:	50/60 Hz., 250 Watts
240 Vac:	50/60 Hz., 925 Watts



**NOTES:**



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**NOTES:**



## CL1600 Surface Probe Calibrator

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**NOTES:**



## 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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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