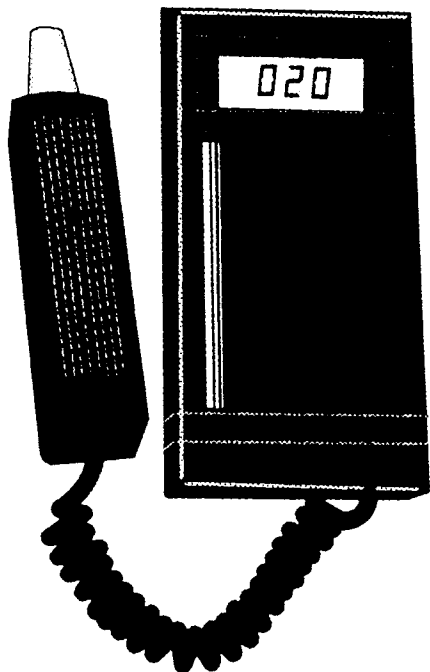




User's Guide



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**OS-611, OS-612
OS-613, and OS-614
Portable Infrared Pyrometers
XXXXX XXXXXXXXXX**

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Laval (Quebec) H7L 5A1
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The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. 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, patient-connected applications.

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SECTION 1 INTRODUCTION

1.1 GENERAL DESCRIPTION

The OMEGA® OS-610 Series Infrared Pyrometers are portable battery-powered instruments for non-contact temperature measurement. There are four models, the descriptions of which are outlined in Table 1-1 below.

**TABLE 1-1
AVAILABLE MODELS**

Model	Range	Resol.	Emissivity	Application
OS-611	0 to 600°F 0 to 315°C	1°F 1°C	0.2 to 1.0	Most popular model; suits most applications
OS-612	-67 to 260°F -55 to 125°C	1°F 1°C	0.2 to 1.0	Low temperature model
OS-613	50 to 122°F 10 to 50°C	0.1°F 0.1°C	0.2 to 1.0	Medical/ biological model
OS-614	0 to 200°F 0 to 90°C	1°F 1°C	0.2 to 1.0	High accuracy (±1°F/0.5°C)

Note: "-A" added to part number signifies that unit includes the Analog Output Option which can not be retrofitted later. The 110 VAC Power Adapter is also supplied with the "-A" option.

Each OS-610 Series Pyrometer is supplied with:

- 9 volt alkaline battery
- Blackbody target stickers
- Operator's manual

Table 1-2 below lists Model numbers of accessories, and replacement parts.

**TABLE 1-2
ACCESSORIES PART NUMBERS**

MODEL NO.	DESCRIPTION
OS-600-STAND OS-610-MOUNT SC-600 OS-600-110AC	Probe Stand Preset Distance Mount Soft Carrying Case 110VAC Power Adapter

1.2 FEATURES

- Fast response for transient temperature measurements
- Four models to meet your specific needs
- Easy to use
- 1 mV per degree analog output option

1.3 APPLICATIONS

- Safely measures electrical components, dangerous and inaccessible materials
- Non-destructive testing of circuit boards, motors and bearings, steam traps, etc.
- Accurately measures small, fragile materials without removing heat from the object as contact probes do

SECTION 2 INSTALLATION

2.1 UNPACKING

Remove the packing list and verify that all equipment has been received. If there are any questions about the shipment, please call OMEGA Customer Service Department .

Upon receipt of the shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

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

2.2 BATTERY INSTALLATION

The battery compartment is located within the instrument case. The battery used is a 9 volt alkaline (Part No. MN1604). To gain access to the battery, remove the four screws from the back of the case and remove the back cover. When the battery needs to be replaced, a "LOW BATT" message appears on the display.

2.3 ANALOG OUTPUT OPTION

The analog output jack will supply a one millivolt per degree signal both in the °F and the °C mode. The analog output cable can be used to provide for recording or controlling temperature. Simply plug the cable into the analog output jack (bottom of case) and connect the striped wires to your recorder or controller.

SECTION 3 OPERATION

3.1 PRINCIPLE OF OPERATION

Each OS-610 probe contains a lens which collects infrared (heat) radiation. This lens focuses the energy onto a detector. Signal processing circuits convert the detector's voltage into a useable temperature reading, and display it on the LCD display.

Before placing the unit into operation, familiarize yourself with the display (Figure 3-1), the 3-way switch location (upper left side of case), how the probe readily disengages from the deep-vee bracket. Test the on-off switch to see that a battery is installed.

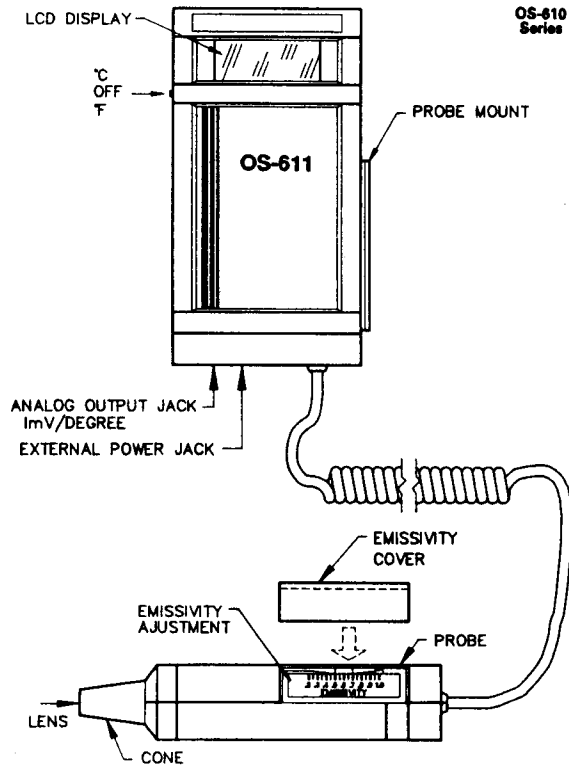


Figure 3-1. OS-610 Series Instrument and Probe

3.2 OPERATING PROCEDURE

Hold the probe only by the plastic body. To maintain accuracy, the front metal cone should be kept at ambient temperature. Avoid contact of the front cone with warm objects for more than a few seconds.

The three-position power switch is used to select °F or °C. Emissivity adjustment is made by positioning the slide potentiometer under the cover on the side of the probe as shown in Figure 3-1. To gain access to the Emissivity Control, press hard on the cover's arrow mark, then move cover in the direction of the arrow. To determine what emissivity setting to use, see Section 3.4.

Measurements can be made from as close as 1/4 inch (0.6 cm) from the object. As the distance from the measured object is increased, the diameter of the measured area (target size) increases proportionally. The next section discusses the "target size" and its relationship to distance.

3.3 CALCULATING TARGET SIZE

Distance to target divided by the target diameter seen by the instrument is called "Distance to Target Ratio". For the OS-610, the ratio is 3 to 1. This means the probe is looking at a one inch diameter target when it is three inches away. Figure 3-2 shows this 3 to 1 relationship. Note that the

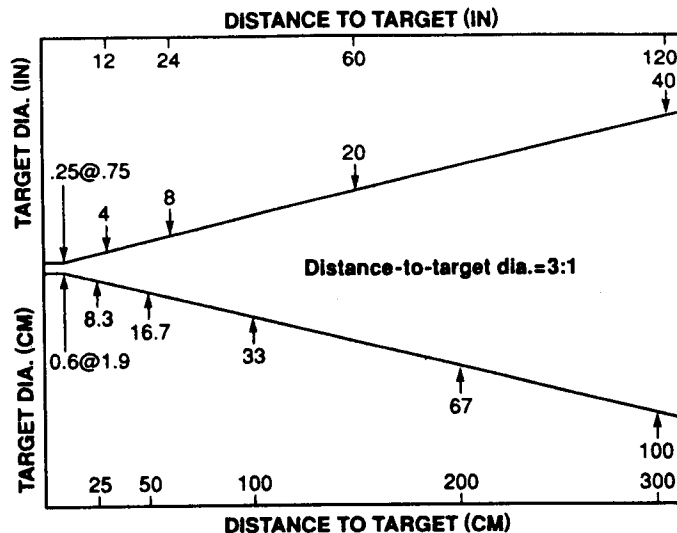


Figure 3-2. Distance to Target Values

minimum spot size is 1/4" at up to 3/4" distance. Measurements can be made at virtually any distance from the target. Any measurement made at an angle other than perpendicular to the target will slightly increase the measured area. The measurement accuracy is, however, unaffected by the angle of measurement.

3.4 EMISSIVITY ADJUSTMENT

Emissivity is a measure of an object's ability to absorb and emit infrared energy. The emissivity of a surface is a measure of its radiating efficiency as compared to an ideal blackbody source. It can have a value from 0.1 (shiny mirror) to 1.0 (blackbody). If a higher than actual value of emissivity is set, the display will read low, and vice versa. A value of 0.95 is the setting for most organic substances such as wood, cloth, plastics, and most paints. It is also applicable to corroded or heavily oxidized metal surfaces. Metals with smooth, polished surfaces have values that are much lower.

To compensate for the emissivity of a specific material, the OS-610 Series units have an adjustable control located in the probe handle under a cover as shown in Figure 3-1. The emissivity value of most common materials can be found in the Emissivity Tables in Section 4. For materials not listed, the proper setting can be determined in one of the following ways:

1. Place one of the enclosed black stickers on the object to be measured. Enter the Emissivity mode and adjust the emissivity to 1.0.

Measure the temperature of the sticker by pressing the SAMPLE key and note the temperature. Next, measure an area next to the sticker by pressing the SAMPLE key. If the reading is the same as the previous one, the emissivity is calibrated for that surface. If it is not, keep the unit pointed at the area next to the sticker. Adjust the emissivity control until the temperature reading matches that of the sticker. If you cannot use the stickers, a flat black paint will do.

2. Determine the actual temperature of the surface using a sensor such as an RTD or thermocouple. Next, measure the surface with the OS-610. Adjust the emissivity in the same manner as above until the same temperature reading is on the display.

SECTION 4 TABLE OF EMISSIVITIES

Emissivity Table

MATERIAL	EMISSIVITY (%)	MATERIAL	EMISSIVITY (%)
Asbestos		PURE AND OXIDIZED METALS	
Board	96	Aluminum, polished	5
Paper	94	Rough surface	7
Slate	96	Strongly oxidized	25
Brick		Brass, dull, tarnished	22
Glazed, rough	85	Polished	3
Fireclay	85	Bronze, polished	10
Masonry	94	Porous, rough	55
Red, rough	90	Cast iron, casting	81
Carbon, purified	80	Polished	21
Cement	54	Chromium, polished	10
Charcoal, powder	96	Copper, commercial, burnished	7
Clay, fired	91	Electrolytic, polished	2
Enamel	90	Oxidized	65
Lacquer	90	Oxidized to black	88
Fabnc, asbestos	78	Gold, polished	2
Glass	92	Iron, hot rolled	77
Frosted	96	Oxidized	74
Graphite, powder	97	Sheet, galvanized, burnished	23
Gypsum	85	Sheet, galvanized, oxidized	28
Ice	97	Shiny, etched	16
Lacquer, bakelite	93	Wrought, polished	28
Black, dull	97	Lead, gray	28
Black, shiny (on metal)	87	Oxidized	63
White	87	Red, powder	93
Lampblack	96	Shiny	8
Oil Paint, various colors	94	Mercury, pure	10
Paper, black, shiny	90	Nickel, on cast-iron	5
Black, dull	94	Pure, polished	5
White	90	Platinum, pure, polished	8
Porcelain, glazed	92	Steel, galvanized	28
Quartz	93	Oxidized strongly	88
Rubber	95	Rolled freshly	24
Shellac, black, dull	91	Rough surface	96
Black, shiny, on tin plate	82	Rusty, red	69
Snow	80	Sheet, nickel plated	11
Tar Paper	92	Sheet, rolled	56
Water	98	Tin, burnished	5
Wood, planed	85	Tungsten	5
		Zinc, sheet	20

SECTION 5 CALIBRATION

Basic operational and accuracy checks of your OS-610 can be made using an OMEGA BB-2 black body, information about which can be found in the "C1" section of the OMEGA Temperature Measurement Handbook.

The calibration of infrared pyrometers however requires a more precise and specialized "Black Body" radiation source than is available to most users. We recommend you return your OS-610 to OMEGA for calibration.

OMEGA offers complete repair and calibration services for your OS-610. Please contact OMEGA Customer Service Department for an authorized return number (AR number), charges and other information. Please have complete model number and billing information available when telephoning or writing.

SECTION 6 SPECIFICATIONS

ACCURACY:	±1% rdg ±1 digit (OS614: ±1°F/1°C)
REPEATABILITY:	±0.5% rdg ±1 digit
MINIMUM TARGET SIZE:	1/4" diam. at 3/4" distance
DISTANCE TO TARGET RATIO:	3 to 1
EMISSIONIVITY:	0.2 to 1.0 adjustable
RESPONSE TIME:	One second
SPECTRAL RESPONSE:	8 to 14 microns
ANALOG OUTPUT:	1 mV per degree
POWER SOURCE:	9 V alkaline battery (incl.)
BATTERY LIFE:	200 hours continuous
AMBIENT TEMP.:	32 to 120°F (0 to 50°C)
SIZE OF PROBE:	1.3"W x 1.3"H x 6.2"D (3.3 x 3.3 x 15.7 cm)
SIZE OF DISPLAY UNIT:	3.2"W x 1.3"H x 6.2"D (8.1 x 3.3 x 15.7 cm)
WEIGHT OF PROBE:	5 oz. (142 g)
WEIGHT OF DISPLAY UNIT:	9.6 oz. (272 g)

MADE IN

USA

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **25 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **two (2) 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 which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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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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