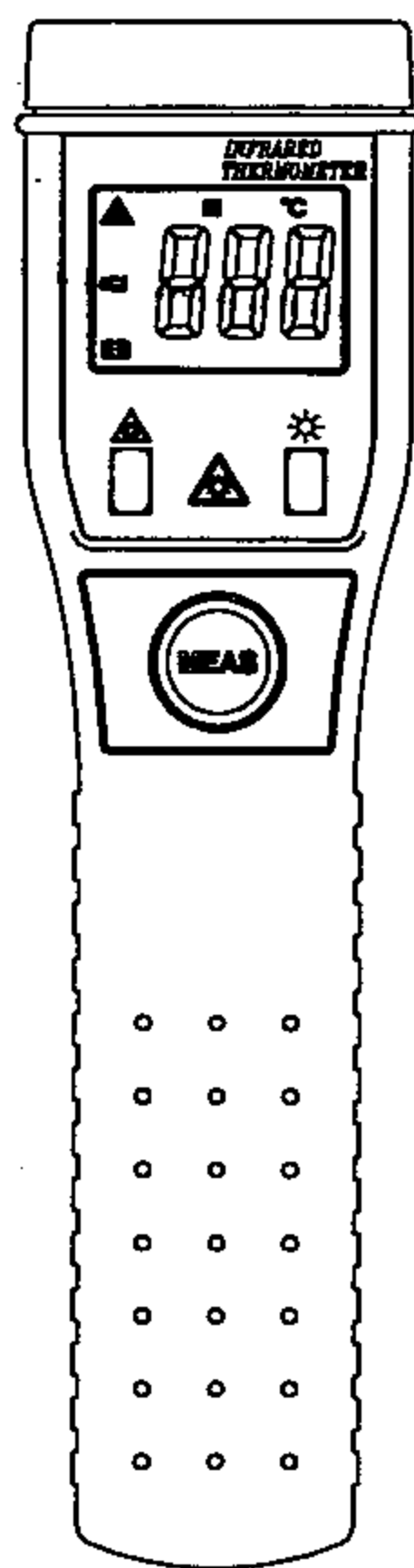


OPERATING INSTRUCTIONS

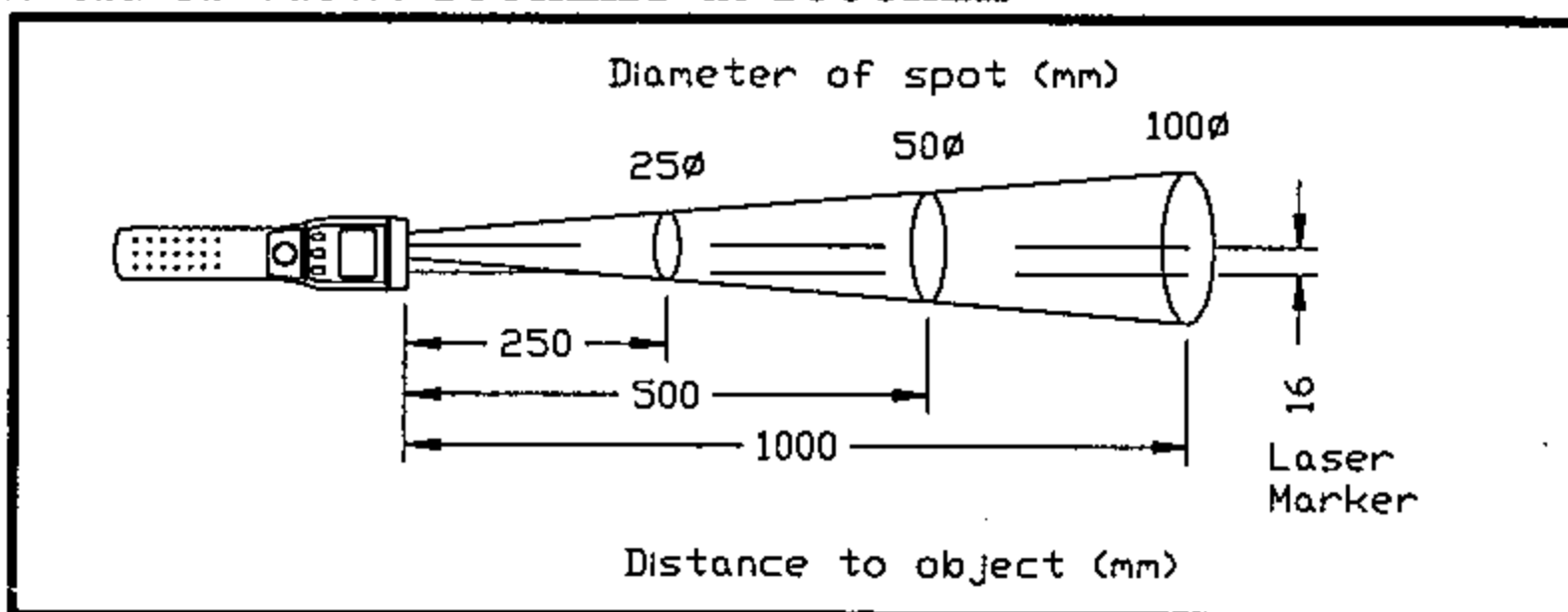
MODEL 610LC

INFRARED THERMOMETER WITH LASER MARKER



Ver. 1

Response Time: 1 second
Spectral Response: 6 to 14 μ m nominal
Emissivity: Pre-set 0.95
Analog Output: 1mV/ $^{\circ}$ C
Detection Element: Thermopile
Optical Lens: Fresnal Lens
Sighting: 1-beam laser marker < 1mW (class 2)
Field of View: 100mm \varnothing at 1000mm




Spot size increases with distance from the probe tip as shown



OPERATING INSTRUCTIONS

Push buttons

Display Back-Light Button

Release MEAS button then press "" button to toggle between turn on and turn off the Back-Light. When releasing MEAS button Back-Light will turn off automatically after 15 seconds to extend battery life.

Laser Marker Button

Release MEAS button then press "" button to toggle between turn on and turn off the Laser Marker annunciator. If "" annunciator turn on, press MEAS button the laser marker beam is being emitted, releasing MEAS button turn off the laser marker beam.


INTRODUCTION

This instrument is a portable easy use 3½ digit, compact-sized digital infrared thermometer with laser marker designed for simple one hand operation. Meter with Backlit LCD display, Auto-hold function and auto power off (15 seconds approx.) feature after releasing MEAS button to extend battery life.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the infrared thermometer.

DANGER



Pressing the  button turns the laser marker on and off. Exercise extreme care and do not allow the laser beam to enter your eye or those of any other person or animal.

- Do not look directly into the laser light from the optical system.
- When measuring the temperature of an object which has a mirror finish, be careful not to allow the laser light beam to be reflected off the surface into your eyes or those of another person.
- Do not allow the laser light beam to impinge upon any gas which can explode.

MEAS (MEASURE) Button

Depress MEAS button to turn on the meter for measuring temperature. Releasing MEAS button to stop measuring temperature and automatically hold the display reading, the meter turns off automatically after 15 seconds.

OPERATION

1. When the power is off, pressing the MEAS button turns on the power.
2. Use "" button to select turn on or turn off the display Back-Light.
3. Use "" button to select turn on or turn off the Laser Marker.
4. Point the lens at the object whose temperature is to be measured.
5. Press the MEAS button. Measurement is performed as long as the MEAS button is kept pressed.
6. Referring to the spot size figure, aim the laser beam at the object whose temperature is to be measured.

NOTE: Although the field of measurement (or Field of View) and the spot almost coincide, actually the field of measurement corresponds to the diameter for 90% optical response. The object whose temperature is to be measured needs to be larger than the measurement diameter (spot of size) by an adequate margin at least 1.5 to 2 times larger.

7. Read the display.

CAUTION

- Do not use the unit near any device which generates strong electromagnetic radiation or near a static electrical charge, as these may cause errors.
- Do not use the unit where it may be exposed to corrosive or explosive gases. The unit may be damaged, or explosion may occur.
- Do not keep or use this unit in an environment where it will be directly illuminated by sunshine, or where it will be exposed to high temperatures, high humidity or condensation. If you do, it may be deformed, its insulation may be damaged, or it may no longer function according to specification.
- Do not point the lens at the sun or at any other source of strong light. If you do, the sensor may be damaged.
- Do not contact the lens against the object whose temperature is to be measured, or get it dirty, allow it to be scratched, or allow any foreign material to adhere to it. Doing so may cause errors.
- Do not touch or hold by the front cone. Temperature reading can be affected by heat from hand.
- Do not place the meter on or around hot objects (70 $^{\circ}$ C/158 $^{\circ}$ F). It may cause damage to the case.
- If the meter is exposed to significant changes in ambient temperature (hot to cold or cold to hot). Allow 20 minutes for temperature stabilization, before taking measurement.
- Condensation may form on the lens when going from a cold to hot environment-wait 10 minutes for condensation to dissipate before taking measurements.
- This unit is not constructed to be water proof or dustproof, so do not use it in a very dusty environment or in one where it will get wet.

MEASUREMENT CONSIDERATIONS

1. Theory of Measurement
Every object emits infrared energy in accordance with its temperature. By measuring the amount of this radiant energy, it is possible to determine the temperature of the emitting object.
2. About Infrared
Infrared radiation is a form of light (electromagnetic radiation), and has the property that it passes easily through air while it is easily absorbed by solid matter. With an emission thermometer which operates by detecting infrared radiation accurate measurement is possible, irrespective of the air temperature or the measurement distance.
3. Emission Thermometer Structure
Infrared radiation which has been emitted from the object is focused upon an infrared radiation sensor, via an optical system. This includes a lens which is transparent to infrared radiation. And 5.3 μ m cut off filter. The output signal from the infrared radiation sensor is input to an electronic circuit along with the output signal from a standard temperature sensor (Thermopile).
4. Emissivity
All objects emit invisible infrared energy. The amount of energy emitted is proportional to the object's temperature and its ability to emit IR energy. This ability, called emissivity, is based upon the material that the object is made of and its surface finish. Emissivity values range from 0.10 for a very reflective object to 1.00 for a black body. Factory set emissivity value of 0.95, which cover 90% of typical applications.
5. If the surface to the measured is covered by frost or other material, clean it to expose the surface.


SPECIFICATIONS

GENERAL

Display:

3½ digit liquid crystal display (LCD) with maximum reading of 1999

Overrange: (OL) or (-OL) is displayed

Low battery indication: the "" is displayed when the battery voltage drops below the operating level

Measurement rate: 2.5 times per second, nominal.

Operating Environment: 0 $^{\circ}$ C to 50 $^{\circ}$ C at < 70% relative humidity

Storage Temperature: -20 $^{\circ}$ C to 60 $^{\circ}$ C, 0 to 80% R.H. with battery removed from meter

Auto power off: 15 seconds approx

Standby consume current: < 1 μ A

Battery: 4 pcs 1.5V (AAA size) UM-4 R03

Battery Life: 100 hours (continuity) typical with carbon-zinc battery (Laser marker and Back-Light not illuminated)

Dimensions: 170mm(H) x 44mm(W) x 40mm(D)

Weight: 160g including batteries

ELECTRICAL

Temperature Range: -20 $^{\circ}$ C to 260 $^{\circ}$ C

Display Resolution: 1 $^{\circ}$ C


Accuracy: \pm 3% of reading or \pm 3 $^{\circ}$ C, whichever is greater @ 18 to 28 $^{\circ}$ C ambient operating temperature.

Temperature Coefficient: \pm 0.2% of reading or \pm 0.2 $^{\circ}$ C, whichever is greater, change in accuracy per $^{\circ}$ C change in ambient operating temperature above 28 $^{\circ}$ C or below 18 $^{\circ}$ C

6. If the surface to be measured is highly reflective, apply masking tape or matt finish black paint to the surface.
7. If the meter seems to be giving incorrect readings check the front cone. There may be condensation or debris obstructing the sensor; clean per instructions in the maintenance section.

MAINTENANCE

Battery Replacement

Power is supplied by four 1.5V (AAA size) batteries. The "" appears on the LCD display when replacement is needed. To replace the batteries, remove the screw from the back of the meter and lift off the battery cover case. Remove the batteries from battery contacts.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.

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	0.85 to 0.91	Iron oxides	0.78 to 0.82
Brick (red)	0.93 to 0.96	Textiles	0.90