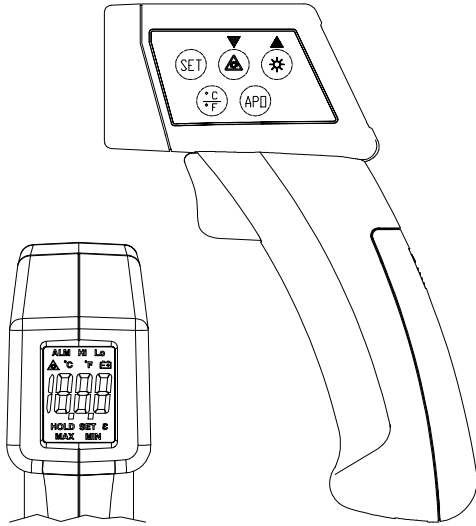


OPERATING INSTRUCTIONS

MODEL: 111 INFRARED THERMOMETER WITH LASER SIGHTING




INTRODUCTION

This instrument is a portable easy to use 3½digit, compact-sized digital infrared thermometer with laser sighting designed for simple one hand operation. Meter comes with backlight LCD display, Auto-Hold function and Auto Power Off (10 seconds approx.) to extend battery life.

SAFETY INFORMATION

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

DANGER

When  sign appears, pull the trigger to turn the laser beam on and off.

Be very cautious with the laser beam, not aiming your eyes 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.


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 condensation. If you do, it may be deformed, its insulation may be damaged, or it may no longer function according to specification.
- Do not place the meter on or around hot objects (70°C/158°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 30 minutes for temperature stabilization, before taking measurement.
- Condensation may form on the sensor 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 waterproof or dust proof, so do not use it in a very dusty environment or in one where it will get wet.
- **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 case. Temperature reading can be affected by heat from hand.**
- **Readings may be affected if the unit is operated within a radio frequency electromagnetic field strength of approximately 9 volts per meter, but the performance of the instrument will not be permanently affected.**

SPECIFICATIONS

GENERAL

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

Low battery indication: The “” is displayed when the battery voltage drops below the operating level.

Measurement rate: 0.25 second per measurement.

Operating Environment: 32°F to 122°F (0°C to 50°C) at < 70% R.H.

Storage Temperature: -4°F to 140°F (-20°C to 60°C), 0 to 80% R.H. with battery removed from meter.

Auto power off: 10 seconds.

Standby consuming current: <5µA.

Battery: Standard 9V battery (NEDA 1604, IEC 6F22 006P).

Battery Life: 9 hours (continuity) typical.
(contain Laser and Backlit)

Dimensions: 148mm(H) x 105mm(W) x 42mm(D).

Weight: approx. 157g. (including battery)

Laser Specifications

Laser safety classification of Class 2.

Wave Length: Red (630~670nm).

Power out: <1mW, class 2 laser product.

ELECTRICAL

Temperature Range: -30°C to 550°C / -22°F to 1022°F.

Display Resolution: 0.5/1°C (Auto), 1°F.

Accuracy:

±(2°C/4°F) for -30°C to 100°C, -22°F to 212°F.

±(2% reading) for 101°C to 550°C, 213°F to 1022°F.

Temperature Coefficient:

±0.2% of reading or ±0.36°F/0.2°C, whichever is greater, change in accuracy per °F/°C change in ambient operating temperature above 82.4°F/28°C or below 64.4°F/18°C.

Response Time: 0.25 second

Spectral Response: 6 to 14µm

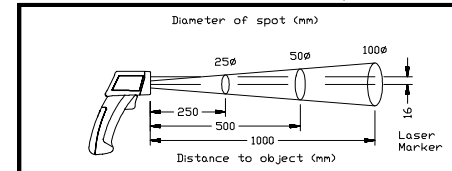
Adjustable emissivity (ε): 0.1 to 1.0.

Detection Element: Thermopile.

Optical Lens: Fresnel Lens.

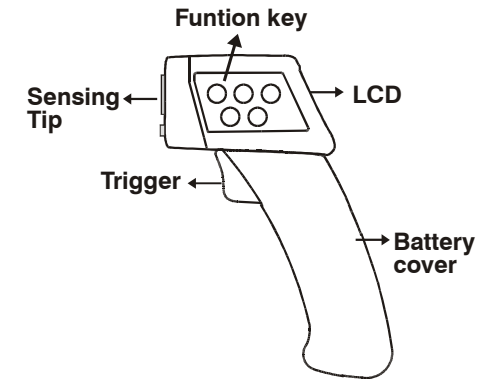
Sighting: 1-beam laser marker <1mW (class 2).

Field of View: 100mmØ at 1000mm (3.9"Ø at 39.0").



Spot size increases with distance from the probe tip as shown (Spot Diameter measured at 90 % Energy)

DEFINITION





FUNCTION KEY


SET key

Press “SET” key goes to the setting mode. Use the same key to go to next step, following as the cycle : ε → ALM Hi → ALM Lo → MAX → MIN → measuring mode.

key

Press  key, LCD shows “” sign. Then pull the trigger to turn on laser pointing function to aim at the measuring point of object. Repeat same steps turns off laser pointing function.

key

Use  key to turn on or off the Back-Light function.

°C/°F key



Use the °C/°F key to select reading displayed in Celsius(°C) or Fahrenheit(°F).

APO key

The meter is default to APO (auto power off) activated along with manual mode. Leave the meter without operation for 10 seconds, power turns off automatically.

Press “APO” key to disable APO function and will go to auto continuous mode. Continuous measuring will be performed without holding the trigger. Press “APO” key again to return to APO activated along with manual mode.

and key

Use  or  to adjust ε, ALM Hi, and ALM Lo in setting mode. Hold the key will speed up.

OPERATING INSTRUCTIONS

Power on and off:

1. Pull the trigger to turn on power. The LCD shows readings from last measurement.
2. Auto Power Off (APO) function: Leave the meter without operation for 10 seconds, power turns off automatically.

Manual Single and Continuous Mode:

1. The meter is default to manual mode. Pull the trigger to turn on power. Aim at the object, and quickly pull the trigger to measure. When the LCD shows readings and "HOLD" sign, single measurement is completed. Leave the meter without operation for 10 seconds, power turns off automatically.
2. Hold the trigger to measure continuously. Reading changes every 0.25 second until the trigger is released. At the mean time, LCD shows last reading and "HOLD" sign.

Auto Continuous Mode:

The meter is default to manual mode. Press "APO" key. Auto power off function will be cancelled, and auto continuous mode is activated. No need to hold the trigger, the meter measures automatically. LCD will not show "HOLD" sign and reading changes every 0.25 second. Press "APO" key again returns to manual mode.

Emissivity, Hi/Lo Limit Setting and MAX/MIN:

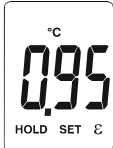
Power on. Press "SET" key to enter setting mode and use the same key to go to next step, following as the cycle:

- ε : Emissivity; Use ▲ or ▼ to adjust. (Table 1)
- ALM Hi : High Limit Alarm Function: Use ▲ or ▼ to adjust. When reading is higher than setting, beeper makes brief beeping sound, and LCD shows "ALM Hi" sign.
- ALM Lo : Low Limit Alarm Function: Use ▲ or ▼ to adjust. When reading is lower than setting, beeper goes off a long beep, and LCD shows "ALM Lo" sign.
- MAX : MAX shows the highest reading during continuous measurement.
- MIN : MIN shows the lowest reading during continuous measurement.

Measuring mode: After the settings and displays, the meter returns to measuring mode and ready for use.

※Setting has to be completed by finishing the whole process and return to measuring mode. If users need to exit setting mode in the middle of process, pull the trigger will skip setting and goes to measuring mode. Be aware that the previous setting is not saved.

※APO function is off in setting mode.



OPERATION

1. Take the protective cap off and then pull the trigger to turn on the meter.
2. Point the lens at the object whose temperature is to be measured.
3. Aim at the object, and quickly pull the trigger to measure. When the LCD shows readings and "HOLD" sign, single measurement is completed.
4. Hold the trigger to measure continuously. Reading changes every 0.25 second until the trigger is released. At the mean time, LCD shows last reading and "HOLD" sign.
5. Put the cap back on to extend sensor life and to avoid damages from inappropriate use of laser pointer.

※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.

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 5.3μm 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.

MAINTENANCE

Trouble Shooting

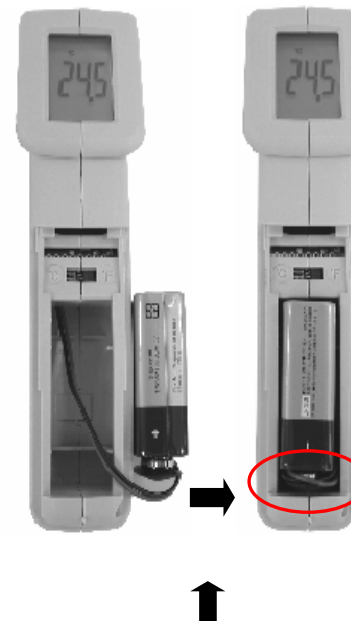
1. If the surface of the object is covered by frost or other material, clean it to expose the surface.
2. If the surface to be measured is highly reflective, apply masking tape or matt finish black paint to the surface.
3. If the meter seems to be giving incorrect readings check the sensing tip. There may be condensation or debris obstructing the sensor; clean it by following instruction.

Battery Replacement

1. Power is supplied by a 9 volt "transistor" battery. (NEDA 1604, IEC 6F22).
2. Pull off battery cover "☒".
3. Remove the battery cover by gently sliding it towards the bottom of the meter.
4. Remove and disconnect the old battery from the meter and replace with a new unit. Wind the excess lead length and put the top of battery toward the lower side of the battery chamber.
5. Put on the battery cover.
6. When battery is installed, the meter turns on automatically to check the battery conditions. Power will turn off automatically after 10 seconds without operation.

Cleaning

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



Caution

(Table 1)

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 (red)	0.93 to 0.96	Textiles	0.90

Laser Sighting Caution

CAUTION

← **AVOID EXPOSURE** Laser radiation is emitted from the APERTURE

LASER RADIATION-DO NOT STARE INTO BEAM
POWER OUT: <1mW
WAVE LENGTH: RED (630-670nm)
LASER SAFETY CLASSIFICATION OF CLASS 2
EN 60825-1:1994/A11:1996/A2:2001