

Frequently Asked Questions on Infrared Temperature Measurement

How do infrared (IR) thermometers work?

All objects emit infrared energy. The hotter an object is, the more active its molecules are, and the more infrared energy it emits. An infrared thermometer houses optics that collect the radiant infrared energy from the object and focus it onto a detector. The detector converts the energy into an electrical signal, which is amplified and displayed.

IR thermometer is strictly a passive device and will not effect the measured equipment as the IR energy comes into the device and is not emitted by the thermometer.

What response time can I expect from an IR thermometer?

The response time of IR thermometers is faster than most thermometers; approximately 0.5 second.

What is the maximum distance I can make measurements from the target?

This is a function of the optics in your thermometer. Use the distance-to-size ratio and the diameter of your target to determine the maximum distance you can be from the target. Most IR thermometers have a maximum measuring distance of approximately 100 feet (30 meters), depending on atmospheric conditions.

What is spectral range? Why is it important?

The infrared spectral range is 0.7 to 1000 μm , the range for wavelength in which infrared radiation is transmitted. For cost reasons, IR thermometers generally operate under 20 μm . Most of the IR thermometers that we carry have a spectral response of 8-20 μm . This range is used because it is minimally effected by CO_2 and H_2O in the atmosphere. With longer, lower-energy wavelengths, the accuracy decreases with increased distances due to the affects of the atmosphere (humidity).\

What is emissivity?

Emissivity is the ability of an object to emit or absorb energy. Perfect emitters have an emissivity of 1, emitting 100% of incident energy. An object with an emissivity of 0.8 will absorb 80% and reflect 20% of the incident energy. Emissivity may vary with temperature and spectral response (wavelength). Infrared thermometers will have difficulty taking accurate temperature measurements of shiny metal surfaces unless they can adjust for emissivity.

How can the emissivity of an object be determined?

First, measure the surface temperature of the object to be measured with a surface-type thermocouple probe. Measure the same surface with an IR thermometer, adjusting emissivity on the thermometer until the temperature readings on both the thermocouple and IR meters agree.

For temperatures up to approximately 500°F (260°C), place a piece of regular masking tape on the object to be measured. Allow the tape to reach thermal equilibrium with the object. Using an IR thermometer with the emissivity set at 0.95, measure and note the temperature of the masking tape. Then, measure the surface temperature of the object. Adjust the emissivity until the temperature of the object is the same as that of the tape.

What area does the IR thermometer measure?

It measures the average temperature of the surface within the measuring diameter.