

About temperature & thermometers

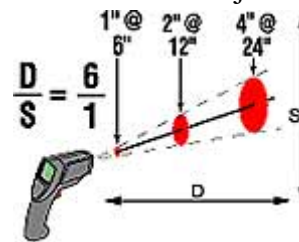
Contact & non-contact

Advantages of Using IR Thermometers

Infrared technology has been utilized successfully in industrial and research settings for decades, and with innovations to reduce costs and improve reliability, Pacific Sensor Technologies infrared thermometer PST-C350 uses sensors that offer smaller units of measurement. All of these factors have led infrared technology to become an area of interest for new kinds of applications and users.

It's easy to take a temperature measurement, just point the unit or sensor at the object you wish to measure and read the temperature on the unit's LCD or monitor. When using IR thermometers keep in mind the following:

- Distance to Target (Spot) Ratio
- Field of View
- Environmental Conditions
- Ambient Temperatures



The optical system of an infrared sensor collects the infrared energy from a circular measurement spot and focuses it on the detector. Optical resolution is defined by the ratio of the distance from the instrument to the object, compared to the size of the spot being measured (D:S ratio). The larger the ratio numbers the better the instrument's resolution, and the smaller the spot size that can be measured from greater distance.

The laser sighting included in some instruments only helps to aim at the measured spot, it does not measure anything. A recent innovation in infrared optics is the addition of a Close Focus feature, which provides accurate measurement of small target areas without including unwanted background temperatures.

Field-of-view

Make sure that the target is larger than the spot size the unit is measuring. The smaller the target, the closer you should be to it. When accuracy is critical make sure that the target is at least twice as large as the spot size.

Environmental Conditions

Watch for environmental conditions in the working area. Steam, dust, smoke, etc., can prevent accurate measurement by obstructing the unit's optics. Noise, electromagnetic fields, or vibration are other conditions that should also be considered before installation begins.

Ambient Temperatures (the surrounding temperature)

If the thermometer is exposed to abrupt ambient temperature differences of 20 degrees or more, allow it to adjust to the new ambient temperature for at least 20 minutes.

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Emissivity of Most Common Materials

Emissivity is the measure of an object's ability to emit infrared energy. Emitted energy indicates the temperature of the object. Emissivity can have a value from 0 (shiny mirror) to 1.0 (blackbody). Most organic, painted, or oxidized surfaces have emissivity values close to 0.95. Some of our portable thermometers have adjustable emissivity to ensure accuracy when measuring other materials such as shiny metals. You can choose units with adjustable or preset to 0.95 emissivity.

If you are using a thermometer with a fixed, preset emissivity of 0.95, and need to measure a shiny object you can compensate by covering the surface to be measured with spray oil, flat black paint or masking tape. Measure the temperature of the taped or painted surface. That is the true temperature

Emissivity Table for Non-Metals

Material	Emissivity			
	1.0 µm	5.0 µm	7.9 µm	8-14 µm
Asbestos	0.90	0.90	0.95	0.95
Asphalt	n.r.	0.90	0.95	0.95
Basalt	n.r.	0.70	0.70	0.70
Carbon				
Un-oxidised	0.80-0.95	0.80-0.90	0.80-0.90	0.80-0.90
Graphite	0.80-0.90	0.70-0.90	0.70-0.80	0.70-0.80
Carborundum	n.r.	0.90	0.90	0.90
Ceramic	0.40	0.85-0.95	0.95	0.95
Clay	n.r.	0.85-0.95	0.95	0.95
Concrete	0.65	0.90	0.95	0.95
Cloth	n.r.	0.95	0.95	0.95
Glass				
Plate	n.r.	0.98	0.85	0.85
Gob	n.r.	0.90	n.r.	n.r.
Gravel	n.r.	0.95	0.95	0.95
Gypsum	n.r.	0.40-0.97	0.80-0.95	0.80-0.95
Ice	n.r.		0.98	0.98
Limestone	n.r.	0.40-0.98	0.98	0.98
Paint (non-Al.)		0.90-0.95	0.90-0.95	
Paper (any colour)	n.r.	0.95	0.95	0.95

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Material	Emissivity			
Plastic				
Opaque	n.r.	0.95	0.95	0.95
Over 20 mils	n.r.			
Rubber	n.r.	0.90	0.95	0.95
Sand	n.r.	0.90	0.90	0.90
Snow	n.r.		0.90	0.90
Soil	n.r.	<>	0.90-0.98	0.90-0.98
Water	n.r.		0.93	0.93
Wood, (natural)	n.r.	0.90-0.95	0.90-0.95	0.90-0.95

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