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Correct Infrared Thermometer Selection and Usage

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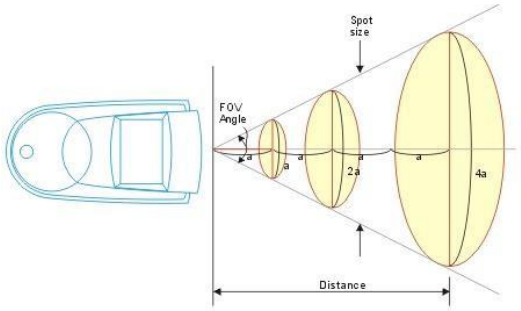
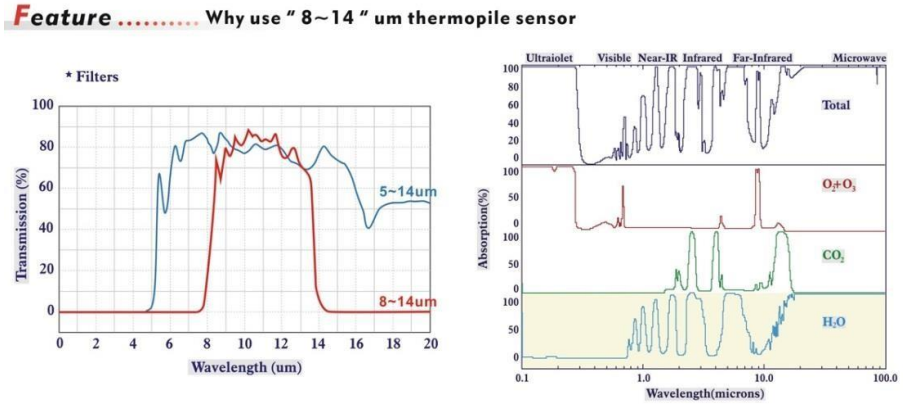
Infrared thermometers are only accurate if used properly and for applications for which they are suitable. But if used correctly they are good tool in any QA program. They measure reflected infrared light and this is affected by several factors:

1. **Distance** As you increase the distance from the object, the SPOT being measured grows in diameter (the laser spot only indicates the center of the area measured). A higher D:S (Distance to Spot) ratio means you can measure smaller spots from farther away. For example, a 10:1 D:S ratio means a spot 1m in diameter is measured from 10m away. A 50:1 D:S ratio means a spot 1m in diameter is measured from 50m away and so on. Thus if you point an IR thermometer at a box close up you will only be measuring the box and get a correct surface reading, but if you measure it from far away you will be measuring the box and the wall behind it and get an averaging of the box and wall. Making sure meter users understand this will greatly improve the accuracy



2. **Emissivity or reflectivity of object measured**. If an IR thermometer is calibrated for objects of a specific emissivity it will be more accurate with objects of a similar emissivity. Emissivity varies depending on the colour, reflectivity, shape etc. of the product measured. Most IR thermometers are fixed at 0.95 emissivity simply because this is most common for wood, paper etc. We use 0.97 E on our high accuracy Food Inspector grade models because this is better for most foods. Some models have adjustable emissivity and variable emissivity allows units to be fine-tuned for specific products, but will also make them less accurate for many others. Therefore, it is important to limit usage of each IR thermometer for usage with specific materials. Why is this important? Please look at the charts shown here. Here you will see that moisture/humidity will interfere mostly in the 5-8 um range. If you can see your breath in the cooler, then 5-14 um I.R.'s should not be used. The more expensive thermopiles we use are also far more accurate. A standard 5-14 um model would give a reading of over 10C difference at 290C.

3. **Diffraction Grating of optics**. This is something you rarely see discussed. Most cheap and even many overpriced models use a 5-14 um wavelength. 5-8 um is where most moisture is detected. If you are in a cold condensing environment or in a humid cook zone you need an 8-14 um unit which is what all of our Food Inspector models are.



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4. **Steam, smoke, dust**. These are optical devices; try to keep the lenses clean using optical grade lens cleaners. Also try not taking readings through steam or smoke as the particles may reflect their temperature instead of the object of choice being monitored.

5. **Temperature variances**. In IR thermometers the optics can change shape as the temperature changes causing errors optical error. Also, if there is a large difference in temperatures condensation can form on the lenses also affecting the reading. Ideally the IR (or other electronics) used in production areas should be stored at those temperatures to help prevent rapid changes in the optics and electronics that create varying errors. The other factors that affect most electronics are actual variances in the temperature of the electronics. Our units use temperature compensation in the electronics to help offset rapid changes in temperature that typically can affect electronics. But rapid changes in moving from one zone to another may still cause errors and it is better if the temperature of the units are kept relatively stable. (Same as in standard thermometers or other instruments)

6. **Temperature Range** It may seem obvious that selecting a thermometer with a wider range would be better? The truth is exactly the opposite. All sensor types have a wider range of measurement but if only calibrated over a portion of that range, then the accuracy can be greatly improved. Scigiene's Food inspector thermometers are calibrated over a narrower range (-55 to 250°C) than most standard all-purpose I.R. units. This range is more than enough for most food processor uses and doubles the accuracy. Only Scigiene Food Inspector series I.R. thermometers go through this stringent process to improve your accuracy. On the other hand, if you are smelting steel then our variable emissivity units with wider range are better. (30:1 8 Point Laser Function Infrared Thermometer or IR Thermometer 50:1 Heavy Duty Dual Laser + Thermocouple Socket)

7. **Surface versus Internal Temperatures**-IR thermometer measure reflected light and therefore only take the surface temperature, not internal temperatures of products (correlations can be done for internal temperature but only under very controlled circumstances). This is why we offer dual mode models (FI40P, TCT303F) and models with optional external probes (FI51,…) that allow users to do fast surface scans and if the readings are suspect then you can revert to taking internal reading with a probe.

Hints to get accurate reading with IRT?

The target must cover the whole FOV (Field of View) of the IRT. Avoid polished metal surfaces, rough surfaces give better accuracy.
Be sure the target is large enough to cover to Field of View of the IRT.
Avoid temperature noise (avoid other High temperature objects is nearby) or even bright sunlight.
Try to use it perpendicular to the target surface.

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