INFRARED THERMOMETER CALIBRATION

Unlike standard contact probe-type thermometers, Infrared (IR) thermometers do not directly measure the temperature but instead measure the reflected light at specific wave lengths. As the reflectance or emissivity of a surface can vary depending on the material, finish and even temperature this makes calibration of an IR thermometer a tricky proposition. Why? Simple—If a surface has an emissivity of 0.95 (typical of cardboard) and the unit is certified at 0.95 emissivity then that means it is accurate for surfaces of 0.95 emissivity but may be off significantly if the product measured has a different emissivity. So at 0.95 it may be good for Kraft cardboard boxes, but less than ideal on stainless steel, ice or fresh meat. This explains why they are prevalent in shipping areas but scorned in many production areas. In shipping it is a usually boxes being checked, whereas in production the products and materials to be measures vary significantly. Another issue with IR thermometers is that the optics can change as the temperature changes causing errors. 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. In production areas they can be used but unless you are willing to adjust the emissivity for each measurement it is better to adjust the emissivity of specific units for use with specific products and store and use them in those specific areas. As some of our models are priced below $100, this is a viable option.

So how do you calibrate your IR thermometer?

First take the surface temperature of the object to be typically measured using a surface probe and ensure it is in a stable temperature environment. Once the thermometer reading has stabilized take a reading and then quickly point the IR thermometer at close range (a few cm away) at the same spot and take a reading. Adjust the emissivity until it reads correctly.

With our dual IR/Thermocouple models TN40ALC, TN408LC, and TN418LD, we typically suggest that we certify the unit with a surface probe and use this to validate any IR readings that prove to be suspect or out of range. This is simply due to the other factors that might affect the IR measurement (dirt, scratches, temperature, condensation etc.) that might affect any one surface of the same material.

You also strongly recommend that you use our IR Comparator to validate the accuracy of all your IR thermometers. This can be used on a daily, weekly or monthly basis to determine if there are any underlying damages or inaccuracies to the infra-red thermometer itself. The IR Comparator provides a stable black body temperature and can be used at temperatures up 80C and within the ambient range of the instrument to be tested. A reference probe thermometer can also be inserted at the base of IR Comparator to compensate for minor differences in the readings against the test instrument.

At this point you must be wondering why on earth would I use an IR thermometer if it can be so easily affected by so many factors? Well quite simply most of the time a lot of these are minor and may even offset each other. The advantages are being able to take fast non-contact readings which when compared to the alternative of taking fewer contact readings means you can take many measurements and catch potential problems quickly and then verify with the contact probes.

Of course our dual TC/IR models are as cost effective, if not more so, than most hand held thermometers, so you can use them as a thermocouple thermometer and use them for IR measurements where you find them most suitable.

Internal Temperature Readings

Can IR thermometers take internal readings? In a nutshell, NO. The IR is measuring reflected SURFACE light. In some controlled conditions an IR might be used to indicate that the internal temperature is incorrect. The principle here is that the entire product at a certain point in production has cooled or heated to a certain temperature. If the core temperature is incorrect then the surface temperature MAY be out as well. This is something that QA and engineering would need to work on, on a case by case basis. Again if variances are noted then steps should be taken to take true internal temperature readings. If done properly with the correct checks and balances, this can be a valuable option.

For More Information, Contact us at:

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