

## Why do certain HAKKO products not require calibration?

HAKKO products that use the HAKKO Composite Ceramic™ or HAKKO Induction Heating (IH)™ technology do not require calibration.

Where products use HAKKO Composite Ceramic™ technology, the processor program and circuit design make the system self-compensating for any predictable drift in component characteristics. This self-compensation is continually under control of the microprocessor. This technology also allows for the heating element properties, tip design, and embedding process to be controlled during manufacturing at a precision level which takes into consideration not only variations in the thermal characteristics of the tip due to surface area and mass but also minor variations in the heating element placement.

In all conceivable cases, the service life of the tip or nozzle will end due to wear before the heating element exhibits any form of degradation or failure.

Where products use HAKKO Induction Heating (IH)™ technology, the heating element has a predetermined temperature based on its metallurgical properties, which do not change for the entire service life of the tip and is unaffected by the base unit used to power the heating element.

These factors allow certain HAKKO products to operate within the following specifications:

- Temperature Accuracy within  $\pm 15^{\circ}\text{C}$  ( $\pm 27^{\circ}\text{F}$ ) of the set temperature
- Temperature Stability (at idle) within  $\pm 5^{\circ}\text{C}$  ( $\pm 9^{\circ}\text{F}$ )

Therefore, no calibration is required.

Any soldering station can be verified to be operating within its established specifications or to the current IPC J-STD-001 recommendations, and in a true process control environment, it would be considered best practice. This verification can be accomplished using a calibrated Tip Thermometer, or for more complete verification, the HAKKO FG-101 / FG-101B Soldering Station Tester or an equivalent piece of equipment can be used. It is important to remember that when using any measuring device, the tolerances of that measuring device MUST be factored into the measurement process.

While it is not possible to alter the metallurgical properties of induction heating elements, products that use HAKKO Composite Ceramic™ technology allow for the 'offset' of the display which can increase the accuracy tighter than  $\pm 15^{\circ}\text{C}$  ( $\pm 27^{\circ}\text{F}$ ) but would require the use of an accurate tip temperature thermometer such as the HAKKO FG-100 / FG-100B Tip Thermometer and would be recommended every time a tip is changed.

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When measuring a soldering iron tip temperature, one will find that the tolerances of the station and the tip thermometer do not add arithmetically, but instead as the Root-Sum-Square of the accuracies,

For example, if you were using a Hakko Tip Thermometer and the following Equation for soldering station tolerance and Measurement Device tolerance you can determine the Root- Sum-Square of accuracies.

$$\begin{aligned} & \sqrt{(\text{Soldering Station Tolerance})^2 + (\text{Measurement Device Tolerance})^2} \\ &= [\sqrt{(15^\circ\text{C})^2 + (3^\circ\text{C})^2}] + 1^\circ\text{C} \\ &= [\sqrt{(234^\circ\text{C})}] + 1^\circ\text{C} \\ &= \pm 16.3^\circ\text{C} \text{ or } \pm 29.3^\circ\text{F} \end{aligned}$$

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