

Why do certain HAKKO products not require calibration?

Hakko Soldering and Desoldering Stations and Rework Systems that use Composite Tip Technology do not require calibration due to the processor program design which makes the circuitry of the system self-compensating for any predictable drift in component characteristics. This self-compensation is continually under control of the microprocessor.

In addition to the processor program design, the Composite Tip Technology allows for the heating element properties to be design into and controlled at a precision level at the factory which allows heating elements to remain consistent within $\pm 15^{\circ}\text{C}$ (unless otherwise indicated on the composite tip package label).

In combination, these two 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 selected temperature
- Temperature Stability (at idle) within $\pm 5^{\circ}\text{C}$ ($\pm 9^{\circ}\text{F}$)

In all conceivable cases, the service life of the tip or nozzle will end due to wear before the heating element may exhibit any form of degradation or failure. Tip design and manufacturing processes take into consideration not only variations in the thermal characteristics of the tip due to surface area and mass, but also variations between the heating elements themselves, within the limits already established.

Therefore, no calibration is necessary.

If one desires to increase the accuracy of the tip temperature, the internal software of these HAKKO products allows for the 'offset' of the display to be adjusted to an accuracy tolerance tighter than $\pm 15^{\circ}\text{C}$ ($\pm 27^{\circ}\text{F}$). The offset value can be increased or decreased to achieve this tighter tolerance beyond the factory specification. This process would require the use of an accurate tip temperature thermometer such as the HAKKO FG-100 Tip Thermometer, and would be needed every time a new tip is used.

Any soldering station can be verified to be operating within the current IPC J-STD-001 guidelines, and in a true process control environment, it would be a best practice. This verification can be accomplished using a Hakko FG-100 Tip Thermometer, or for a more complete verification against the IPC standard, the Hakko FG-101 Soldering Station Tester should 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.

For example, when measuring a soldering iron tip temperature, one will find that the tolerances of the station and the tip thermometer to not add arithmetically, but instead as the Root-Sum-Square of the accuracies, so if you were using a Hakko FG-100 Tip Thermometer:

$$\sqrt{(\text{Soldering Station Tolerance})^2 + (\text{Measurement Device Tolerance})^2}$$

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

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