American Hakko Products, Inc.

Answering calibration questions regarding the FM-202 soldering station

Does the FM-202 require calibration?
The FM-202 Series Soldering Station does not require calibration.

Why does it not require calibration?
First, the processor program is so devised as to make the circuitry as self-compensating as can be for any predictable drift in component characteristics. Everything that goes on inside the FM-202 is under processor control.

Second, the heating element properties have been chosen, and are controlled at the factory, so that the element itself is consistent within $\pm$ 10^{o}C when used in conjunction with the 'process gate'. In all conceivable cases the tip will wear out before the element does (and if the element happens to get broken, the tip is useless anyway).

Third, each FM-202 series tip has associated with it an identifying number (you will find it on the shank of the tip, near the connector end) and a bar code incorporating that identifying number. This identifying number, determined by a process unique to Hakko, equates to a characteristic temperature 'offset' *for that tip*. That is, it takes into consideration not only variations in the thermal characteristics of the tip because of surface area and mass, but also variations between the heating elements themselves, within the limits already established.

Fourth, the 'process gate' - actually a port where the identifying number, as a bar code, is 'read' into the program - allows the operator to enter tip data into the system.

Thus, entering the tip identification number into the FM-202, either manually or automatically per the process gate, causes the FM-202 to 'calibrate' itself for each tip. No external calibration is necessary; hence none is provided to the operator.

What about verification?
Verification can be performed on a FM-202 by using a Hakko 191 thermometer or Hakko 192 soldering tester. Be sure to calibrate the thermometer first, or have it calibrated by a reputable calibration service.

It is then a simple matter to enter a temperature into the FM-202 and verify that the tip is indeed at that temperature (within, of course, the specified accuracies of the FM-202 and the thermometer). When using any measuring device tolerances must be figured into the measuring process. In the case of measuring a soldering iron tip temperature one will find that the tolerances of the FM-202 and the thermometer will add - not arithmetically, but as the root sum square of the specified accuracies: thus the tolerance of a temperature read on, say, a Hakko 191 will be:

$$\text{v(solder station tolerance)}^2 + \text{(thermometer tolerance)}^2$$
$$= [\text{v}(10^{o}\text{C})^2 + (3^{o}\text{C.})^2] + 1\,^{o}\text{C}$$
$$= [\text{v}(109^{o}\text{C})] + 1\,^{o}\text{C}$$
$$= \pm 11.44^{o}\text{C}\ (\pm 20.5^{o}\text{F})$$

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