Thank you for purchasing the HAKKO FM-203 soldering station. Please read this manual before operating the HAKKO FM-203. Keep this manual readily accessible for reference.

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1. PACKING LIST AND PART NAMES

Please check to make sure that all items listed below are included in the package.

HAKKO FM-203 soldering station .................. 1
HAKKO FM-2027 .................. 1
Power cord ............................................. 1
Control card ........................................... 1
Heat resistant pad ................................. 1
Iron holder with tip cleaner ......................... 1
Connecting cable ..................................... 1
Tip tray ............................................... 1
Instruction manual .................................. 1

---

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>117-B2</td>
<td>SHAPE-0.5B Conical</td>
<td></td>
</tr>
<tr>
<td>117-BC1</td>
<td>SHAPE-1BC Bevel</td>
<td></td>
</tr>
<tr>
<td>117-BC2</td>
<td>SHAPE-2BC Bevel</td>
<td></td>
</tr>
<tr>
<td>117-BC3</td>
<td>SHAPE-3BC Bevel</td>
<td></td>
</tr>
<tr>
<td>117-BF1</td>
<td>SHAPE-1BC Bevel</td>
<td>Soldered on the soldering surface only</td>
</tr>
<tr>
<td>117-BF2</td>
<td>SHAPE-2BC Bevel</td>
<td>Soldered on the soldering surface only</td>
</tr>
<tr>
<td>117-BF3</td>
<td>SHAPE-3BC Bevel</td>
<td>Soldered on the soldering surface only</td>
</tr>
<tr>
<td>117-8L</td>
<td>SHAPE-B Long Shape Conical</td>
<td></td>
</tr>
<tr>
<td>117-D08</td>
<td>SHAPE-0.8D Chisel</td>
<td></td>
</tr>
<tr>
<td>117-D16</td>
<td>SHAPE-1.6D Chisel</td>
<td></td>
</tr>
<tr>
<td>117-D24</td>
<td>SHAPE-2.4D Chisel</td>
<td></td>
</tr>
<tr>
<td>117-K2</td>
<td>SHAPE-0.2J Bent</td>
<td></td>
</tr>
<tr>
<td>117-KF</td>
<td>SHAPE-KF Knife</td>
<td></td>
</tr>
<tr>
<td>117-KU</td>
<td>SHAPE-K2 Knife</td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>83411</td>
<td>Iron holder assembly / FM-2022 With screw **</td>
<td></td>
</tr>
<tr>
<td>83412</td>
<td>Iron holder assembly / FM-2022 With screw ***</td>
<td></td>
</tr>
<tr>
<td>83413</td>
<td>Iron holder assembly / FM-2024 With screw **</td>
<td></td>
</tr>
</tbody>
</table>

*3. Sleep mode function
12. OPTIONAL PARTS LIST

- **Optional Parts**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM2022-02</td>
<td>Conversion kit</td>
<td>①</td>
</tr>
<tr>
<td>FM2023-04</td>
<td>Conversion kit</td>
<td>①</td>
</tr>
<tr>
<td>FM2024-01</td>
<td>Conversion kit 120V</td>
<td>①</td>
</tr>
<tr>
<td>FM2024-21</td>
<td>Conversion kit 120V</td>
<td>②</td>
</tr>
<tr>
<td>FM2024-31</td>
<td>Conversion kit 230V</td>
<td>②</td>
</tr>
<tr>
<td>FM2024-33</td>
<td>Conversion kit 230V</td>
<td>②</td>
</tr>
<tr>
<td>FM2024-34</td>
<td>Conversion kit 230V</td>
<td>②</td>
</tr>
<tr>
<td>FM2024-35</td>
<td>Conversion kit 230V</td>
<td>②</td>
</tr>
<tr>
<td>FM2026-06</td>
<td>Conversion kit</td>
<td>①</td>
</tr>
<tr>
<td>FM2027-03</td>
<td>Conversion kit</td>
<td>①</td>
</tr>
<tr>
<td>FG0003-03</td>
<td>Iron holder / FM-2022</td>
<td>With cleaning sponge</td>
</tr>
<tr>
<td>FG0004-03</td>
<td>Iron holder / FM-2023</td>
<td>With cleaning sponge</td>
</tr>
<tr>
<td>FG0005-05</td>
<td>Iron holder / FM-2024</td>
<td>With cleaning wire</td>
</tr>
</tbody>
</table>

* ①: With a steep mode iron holder, connecting cable, heat resistant pad, cleaning sponge
* ②: With a steep mode iron holder, connecting cable, heat resistant pad, 5998

- **Tip Parts for HAKKO FM-2022**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>T16-1001</td>
<td>Tip / CHF 0.5L</td>
<td></td>
</tr>
<tr>
<td>T16-1002</td>
<td>Tip / CHF 0.5L</td>
<td></td>
</tr>
<tr>
<td>T16-1003</td>
<td>Tip / CHF 1L</td>
<td></td>
</tr>
<tr>
<td>T16-1004</td>
<td>Tip / CHF 2L</td>
<td></td>
</tr>
<tr>
<td>T16-1005</td>
<td>Tip / SOP 4L</td>
<td></td>
</tr>
<tr>
<td>T16-1006</td>
<td>Tip / SOP 4L</td>
<td></td>
</tr>
<tr>
<td>T16-1007</td>
<td>Tip / SOP 10L</td>
<td></td>
</tr>
<tr>
<td>T16-1008</td>
<td>Tip / SOP 10L</td>
<td></td>
</tr>
<tr>
<td>T16-1009</td>
<td>Tip / SOP 10L</td>
<td></td>
</tr>
<tr>
<td>T16-1010</td>
<td>Tip / SOP 20L</td>
<td></td>
</tr>
<tr>
<td>T16-1011</td>
<td>Tip / SOP 20L</td>
<td></td>
</tr>
<tr>
<td>T16-1012</td>
<td>Tip / SOP 20L</td>
<td></td>
</tr>
<tr>
<td>T16-1013</td>
<td>Tip / CHF 3L</td>
<td></td>
</tr>
</tbody>
</table>

- **Tip Parts for HAKKO FM-2023**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>Tip / CHF 10</td>
<td></td>
</tr>
<tr>
<td>TP-L1</td>
<td>Tip / CHF 1L</td>
<td></td>
</tr>
<tr>
<td>TP-L2</td>
<td>Tip / CHF 2L</td>
<td></td>
</tr>
</tbody>
</table>

- **Nozzle Parts for HAKKO FM-2024**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>N3-06</td>
<td>Nozzle / 0.6mm (0.02 in)</td>
<td></td>
</tr>
<tr>
<td>N3-08</td>
<td>Nozzle / 0.6mm (0.03 in)</td>
<td></td>
</tr>
<tr>
<td>N3-10</td>
<td>Nozzle / 1.0mm (0.04 in)</td>
<td></td>
</tr>
<tr>
<td>N3-13</td>
<td>Nozzle / 1.3mm (0.05 in)</td>
<td></td>
</tr>
<tr>
<td>N3-16</td>
<td>Nozzle / 1.6mm (0.06 in)</td>
<td></td>
</tr>
<tr>
<td>N3-20</td>
<td>Nozzle / 2.0mm (0.08 in)</td>
<td></td>
</tr>
<tr>
<td>N3-23</td>
<td>Nozzle / 2.3mm (0.10 in)</td>
<td></td>
</tr>
<tr>
<td>N3-L10</td>
<td>Long Nozzle / 1.0mm (0.04 in)</td>
<td></td>
</tr>
</tbody>
</table>

2. SPECIFICATIONS

- **HAKKO FM-203 soldering station**

  - Power Consumption: 140 W
  - Temperature Range: 200 to 450°C (400 to 840°F)
  - Temperature Accuracy: ±5°C (±9°F) at idle temperature
  - Output: 24 V
  - Dimensions (W x H x D): 120 x 120 x 190 mm (4.7 x 4.7 x 7.5 in)
  - Weight (net): 2.7 kg (6.0 lb)

- **HAKKO FM-2027**

  - Power Consumption: 70 W (24 V)
  - Tip to Ground Resistance: < 2 Ω
  - Tip to Ground Potential: < 2 mV
  - Seal Length (net cord): 3.96 mm (1.57 in) with 2.40 lb
  - Weight (net cord): 30 g (0.67 lb), 1.07 oz with 2.40 lb
  - Cord: 1.2 m (4 ft)

  * The temperature was measured using the FG-101 thermometer.
  * This product is protected against electrostatic discharge.
  * This product meets China RoHS requirements.

### CAUTION

This product includes such features as electrically conductive plastic parts and grounding of the handles and station as measures to protect the device to be soldered from the effects of static electricity. Be sure to observe the following instructions:

1. The handle and other plastic parts are not insulators, they are conductors. When replacing parts or repairing, take sufficient care not to expose live electrical parts or damage insulation materials.
2. Be sure to ground the unit during use.

* Specifications and design are subject to change without notice.
3. WARNINGS, CAUTIONS, NOTES AND EXAMPLES

Warnings, cautions and notes are placed at critical points in this manual to direct the operator's attention to significant items. They are defined as follows:

⚠️ **WARNING:** Failure to comply with a WARNING may result in serious injury or death.

⚠️ **CAUTION** Failure to comply with a CAUTION may result in injury to the operator, or damage to the items involved.

**NOTE:** A NOTE indicates a procedure or point that is important to the process being described.

**EXAMPLE:** An EXAMPLE is given to demonstrate a particular procedure, point or process.

⚠️ **CAUTION**

When power is ON, tip temperatures will be between 200 and 450°C. To avoid injury or damage to personnel and items in the work area, observe the following:

- Do not touch the tip or the metal parts near the tip.
- Do not allow the tip to come close to, or touch, flammable materials.
- Inform others in the area that the unit is hot and should not be touched.
- Turn the power off when not in use, or left unattended.
- Turn the power off when connecting the HAKKO FM-2027 or storing the HAKKO FM-203.

⚠️ **CAUTION**

To prevent accidents or damage to the HAKKO FM-203, be sure to observe the following:

- Do not use the HAKKO FM-203 for applications other than soldering.
- Do not strike the iron against hard objects to remove excess solder. This will damage the iron.
- Do not modify the HAKKO FM-203.
- Use only genuine HAKKO replacement parts.
- Do not allow the HAKKO FM-203 to become wet, or use it with wet hands.
- Do not bend or damage the control card. If the card does become damaged, do not force the card into the station slot.
- Remove power and iron cords by holding the plug – not the wires.
- Be sure the work area is well ventilated. Soldering produces smoke.
- While using HAKKO FM-203, don’t do anything which may cause bodily harm or physical damage.

* Tinned on the soldering surface only.
* The iron tips marked with double asterisks (**) have a temperature accuracy of ±2.5°C (±5°F). Others have a temperature accuracy of ±5°C (±9°F).
11. TIP STYLES

Unit: mm (in.)

A. Iron holder
- Loosen the adjusting screws to change the angle of the iron receptacle as you like, then tighten the screws.

1. Assemble as shown:
   - Insert the holder assembly securely into the iron holder base.

2. Operation:
   - First, remove any excess solder from the tip by thrusting the tip into the cleaning wire.
     (Do not wipe the tip against the wire. This may cause molten solder to spatter.)
   - When the wire becomes dirty or loaded with solder, turn the wire until a clean surface is presented.
   - When changing the cleaning wire, lift the case top vertically to prevent solder debris from falling out.

3. Place the spare tips in the tip tray.
   - Use of the sleep function
     - When using the sleep function, insert one end of the connecting cable into the jack at the back of the iron holder and the other end into the jack at the back of the soldering station to connect them.

   **CAUTION**
   - Be sure to turn off the power before connecting or disconnecting the connecting cable.
   - Securely insert the connecting cable all the way to the back.

B. Connector cord
- Pass the connector cord through the hole in the heat resistant pad.
C. Soldering station

**CAUTION**
Be sure to unplug the cord by holding the plug.

- The HAKKO FM-203 detects when the iron is removed from the iron holder and sends this data to the station via the relay cord. That data is then used for various functions.

**NOTE:**
The channel for connecting the relay cord of the iron holder must be the same as the channel for connecting the iron set in the iron holder.

**CAUTION**
Securely insert the relay cord all the way to the back.

1. Connect the power cord to the power receptacle on the rear of the station. Connect the connecting cable to the receptacle.
2. Set the iron in the iron holder.
3. Plug the power cord into a grounded wall socket.

**CAUTION**
This unit is protected against electrostatic discharge and must be grounded for full efficiency. Relay cord connection jacks.

---

**HAKKO FM-2027**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 6</td>
<td>FM2027-01</td>
<td>Conversion kit</td>
<td>⑧ is yellow</td>
</tr>
<tr>
<td>4</td>
<td>FM2027-02</td>
<td>Connector assembly</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>B2215</td>
<td>Connector cover</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B2216</td>
<td>Sleeve assembly</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td>B2217</td>
<td></td>
<td>Orange</td>
</tr>
<tr>
<td></td>
<td>B2218</td>
<td></td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>B2219</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>T1</td>
<td></td>
<td>See section &quot;11. TP STYLES&quot;</td>
</tr>
<tr>
<td>7</td>
<td>B2300</td>
<td>Heat resistant pad</td>
<td></td>
</tr>
</tbody>
</table>

**Iron Holder**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>① - ⑥</td>
<td>RH200-01</td>
<td>Iron holder</td>
<td></td>
</tr>
</tbody>
</table>

**Iron Holder Parts**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>B3001</td>
<td>Iron Holder PartsSpecifications</td>
<td>With screw</td>
</tr>
<tr>
<td>②</td>
<td>B2279</td>
<td>Iron receptacle</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>B244</td>
<td>Tip fixing spring</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>B2251</td>
<td>Holder for iron receptacle Iron holder base</td>
<td>With rubber feet</td>
</tr>
<tr>
<td>⑤</td>
<td>B249</td>
<td>Cleaner base</td>
<td>With rubber feet</td>
</tr>
<tr>
<td>⑥</td>
<td>B3250</td>
<td>Stay</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>B2352</td>
<td>Switch case assembly</td>
<td></td>
</tr>
<tr>
<td>⑧</td>
<td>SHB-02</td>
<td>Tip cleaner</td>
<td></td>
</tr>
<tr>
<td>⑨</td>
<td>369-529</td>
<td>Cleaning wire</td>
<td></td>
</tr>
</tbody>
</table>

**Optional Parts**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑤</td>
<td>B2256</td>
<td>Tip tray</td>
<td></td>
</tr>
</tbody>
</table>
10. PARTS LIST

NOTE:
Spare or repair parts do not include mounting screws, if they are not listed on the description. Screws must be ordered separately.

**HAKKO FM-203 soldering station**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Name</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2494</td>
<td>Heater</td>
<td>120V</td>
</tr>
<tr>
<td>B2495</td>
<td>Transformer</td>
<td>150V</td>
</tr>
<tr>
<td>B2496</td>
<td>Transformer</td>
<td>220V</td>
</tr>
<tr>
<td>B2497</td>
<td>Transformer</td>
<td>240V</td>
</tr>
<tr>
<td>B2498</td>
<td>Transformer</td>
<td>340V</td>
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<td>B2499</td>
<td>Transformer</td>
<td>400V</td>
</tr>
<tr>
<td>B2500</td>
<td>Transformer</td>
<td>450V</td>
</tr>
<tr>
<td>B2501</td>
<td>Transformer</td>
<td>500V</td>
</tr>
<tr>
<td>B2502</td>
<td>Transformer</td>
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<td>Transformer</td>
<td>900V</td>
</tr>
<tr>
<td>B2506</td>
<td>Transformer</td>
<td>1000V</td>
</tr>
</tbody>
</table>

5. OPERATION

**Controls and displays**

**Controls**

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP</td>
<td>Changes display to channel D.</td>
</tr>
<tr>
<td></td>
<td>Press and hold to turn ON or OFF the temperature display for channel D and the power to the iron tip.</td>
</tr>
<tr>
<td></td>
<td>Increases the displayed value when a setting is changed.</td>
</tr>
<tr>
<td>DOWN</td>
<td>Changes the display to channel S.</td>
</tr>
<tr>
<td></td>
<td>Press and hold to turn on or off the temperature display for channel S and the power to the iron tip.</td>
</tr>
<tr>
<td></td>
<td>Decreases the displayed value when a setting is changed.</td>
</tr>
</tbody>
</table>

**Displays**

The HAKKO FM-203 has a three-digit display element.

Depending on the selected mode, it will display:
- Sensor temperature (of the iron tip)
- Data entry:
  - Selected quantity (See the data entry procedures.)
  - Temperature scale:
    - °C or °F, depending on selection
- Error detection (See ERROR MESSAGES.)

An audible buzzer is provided to alert the operator when:
- When the station has reached the set temperature, the buzzer will sound once. (Default setting)
- When the low temperature threshold has been crossed, the buzzer will sound continuously. This buzzer will shutoff when the sensed temperature returns to the acceptable range.
- When a foreign substance, an incompatible tip, or the soldering end of the tip is inserted into the HAKKO FM-2027, the display will blink and the buzzer will sound continuously.
- When the auto-power shutoff function is activated and power to the heater is shut off, the buzzer sounds three times.
**Channel operation**

You can connect the HAKKO FM-2027 or MODEL FM-2022/2023/2024 to the channel D connector, and the HAKKO FM-2027 or MODEL FM-2024 to the channel S connector. The displays of the channel display lamps differ depending on the use of the channels.

- **When the HAKKO FM-2027/MODEL FM-2024 is connected to the channel D connector**
  
  When two HAKKO FM-2027/MODEL FM-2024 units are connected to both channels at the same time, both units are controlled (Factory default setting). The display channel changes when the \[ \text{UP} \] button or \[ \text{DOWN} \] button is pressed, or when the iron is removed from the iron holder. The channel display lamp blinks for the channel being displayed in the current temperature display, and the channel display lamp lights for the channel not being displayed.

- **When the MODEL FM-2022/2023 is connected to the channel D connector**

  When the MODEL FM-2022/2023 is connected to the channel D connector, channel \( S \) automatically enters sleep mode. When the \[ \text{UP} \] button or \[ \text{DOWN} \] button is pressed, or when the iron is removed from the iron holder, the channel for temperature control is switched to that channel.

  The channel display lamp for the temperature-controlled channel lights and the channel display lamp for the channel in sleep mode turns off.

  When the dual channel mode is off, regardless of the type of grip, the station lamp lights for the channel in use (the channel being displayed) and turns off for the channel not in use (the channel not being displayed). The lamp on the grip operates as follows.

  In use ...............Lights
  Sleep mode........Blinks slowly
  Off mode ..........Off
  Error..................Blinks quickly

**- The low-temperature alarm tolerance error \( \text{H-C} \) occurs frequently.**

**NOTE:**
When the temperature rises for one channel and a grip is connected to the other channel, it may take time to correctly determine the temperature. This is not a malfunction.

- **Heater terminal short circuit error \( \text{SSS} \) is displayed.**

**CHECK:**
Is the tip too small for the items to be soldered?

**ACTION:**
Use a tip with a larger thermal capacity.

**CHECK:**
Is the setting value for the low-temperature alarm tolerance too low?

**ACTION:**
Increase the setting value.

**CHECK:**
Is the tip for HAKKO FM-2027?

**ACTION:**
Turn the power switch OFF and insert the genuine HAKKO FM-2027 tip. Turn the power switch ON.

**NOTE:**
This error does not display when not entering the Tip ID.
9. TROUBLE SHOOTING GUIDE

**WARNING**
Before checking the inside of the HAKKO FM-203 or replacing parts, be sure to disconnect the power plug. Failure to do so may result in electric shock.

- **The unit does not operate when the power switch is turned on.**
  - **CHECK:** Is the power cord and/or the connection plug disconnected?
  - **ACTION:** Connect it.
  - **CHECK:** Is the fuse blown?
  - **ACTION:** Investigate why the fuse blew and then replace the fuse. If the cause cannot be determined, replace the fuse. If the fuse blows again, send the unit in for repair.

- **The tip does not heat up.**
  - **The sensor error [ ] is displayed.**

- **Solder does not wet the tip.**

- **The tip temperature is too high.**

- **The tip temperature is too low.**

- **The soldering iron [ ] error is displayed.**

- **When the HAKKO FM-2027/MODEL 2024 is reconnected to the channel D connector**
  - When the MODEL FM-2022/2023 is disconnected from the channel D connector and the HAKKO FM-2027/MODEL FM-2024 is reconnected, temperature control starts for both channels, and the channel display lamp blinks for the channel being displayed in the current temperature display and lights for the channel not being displayed.

**Operation**

1. Turn the power switch ON.

**CAUTION**
When not in use, set the iron in the iron holder. The MODEL FM-204 does not function properly if the power is turned on with the trigger pressed. Release the trigger and then turn the power ON.

2. By default, when the set temperature is reached, the buzzer sounds, indicating that the unit is ready.

When using only one soldering iron:

**Example:**
When not using channel S

**NOTE:**
When the MODEL FM-2022/2023 is disconnected and reconnected, the operation mode may change automatically. In this case, the unit is reset to a new operation mode, thereby canceling sleep mode. This is not a malfunction.

**NOTE:**
By default, the temperature is set to 350°C. You can confirm the set temperature by pressing the button. The set temperature will be displayed for two seconds.

**NOTE:**
When not in use, set the iron in the iron holder.

1. Press the button to select channel S.
2. Press and hold down the button again until OFF is displayed.

**NOTE:**
Power is not supplied to channel S.

3. Press the button to display channel D. This data is recorded to the internal memory, and the setting remains effective even if the power is turned off.
Setting/changing the temperature

Temperature setting range
°C................. 200 to 450°C
°F................. 400 to 840°F

Example: Changing the temperature for channel D from 350°C to 400°C

1. Check that the current temperature display is set to channel D.
   See “Channel operation” (preceding pages).

2. Insert the control card into the station.
   The hundreds digit of the display begins to flash. This indicates that the unit has entered the temperature setting mode and data may be entered.

3. Enter the hundreds digit.
   Press the UP or DOWN button to set the hundreds digit. When the desired figure is displayed, press the button. The tens digit begins to flash.

4. Enter the tens digit.
   Press the UP or DOWN button to set the tens digit. When the desired figure is displayed, press the button. The units digit begins to flash.

5. Enter the units digit.
   Set the desired units digit in the same way as for the tens digit, and then press the button. The temperature is recorded to the internal memory, and heater control begins after the new set temperature is displayed.

To change the set temperature with the control card in the station:

Press and hold the button for at least one second. The current temperature setting is displayed, and then the hundreds digit begins to flash one second later. This indicates that the station has entered the temperature setting mode. When the station is in the temperature setting mode, set or change the temperature above steps 3 to 5.

8. ERROR MESSAGES

- Sensor Error
  - H-E
    - 350°C (400°F) to 50°C
    - Low-temperature alarm tolerance
    - 650°F (750°F - 100°F)

- Low-temperature alarm tolerance error
  - H-E

- Heater terminal short circuit error
  - HSE

- Soldering iron error
  - C-E

- Detection error
  - d-E

When there is the possibility that a failure has occurred in the sensor or heater (including the sensor circuit), S-E is displayed and the power is shut down.

NOTE:
The sensor error also occurs if the tip is not inserted properly. S-E may be displayed for a moment when the grip is connected. This is not an error.

If the sensor temperature falls below the difference between the current temperature setting and the low-temperature alarm tolerance, H-E is displayed and the warning buzzer sounds. When the tip temperature rises to a value within the set tolerance, the buzzer will stop sounding.

EXAMPLE:
Assume that the temperature setting is 400°C/750°F and the tolerance 50°C/100°F. If the temperature continues to decrease and finally falls below the value indicated below, while the heating element is on, the displayed value starts blinking to indicate that the tip temperature has dropped.

HSE will flash, and the buzzer will sound continuously, when the tip is inserted wrong way round, an incompatible tip is inserted, or a foreign object has found its way into the connector.

C-E will be displayed if the connector cord is not attached to the station OR the wrong soldering iron is connected.

d-E appears on the display when turning the power on after connecting the MODEL FM-2022/2023 with a hot tip. This is not an error. Wait for approximately 10 seconds until the model functions properly.
Checking Procedure

WARNING

Unless otherwise directed, carry out these procedures with the power switch OFF and the power UNPLUGGED.

Check for a broken heater or sensor

1. Check for a broken heater or sensor

Measure the resistance across this position.

Verify the electrical integrity of the heater and sensor.

Measure the resistance of the heater and sensor while at room temperature (15 to 25°C; 59 to 77°F). It should be 8Ω ±10%. If the resistance exceeds these limits, replace the tip.

Check the grounding line

Check the connection cord for breakage

Replacing the fuse

Entering the tip offset value

Example: When the set temperature for channel D is 400°C and the actual tip temperature is 410°C, the difference in temperature is 10°C, so enter −10 as the current offset value.

1. Check that the current temperature display is set to channel D.

If the temperature for channel S is displayed, press the button to change the channel.

2. Insert the control card into the station.

The station enters the temperature setting mode.

3. Press the button.

The station enters the offset entry mode. Press the or button to set the hundreds digit.

The values that can be entered in °C or °F are 0 (for positive values) and - (for negative values).

4. Select [ ] or [ ] and press the button.

The tens digit begins to flash. Enter the offset value.

The values that can be entered are 0 to 5 in °C (0 to 9 in °F).

The tens and units digits are set with the offset value range.

Allowable offset value range

°C: −50 to +50°C

°F: −90 to +90°F

If you enter a value outside the allowable offset value range, the display returns to the hundreds digit, and you have to enter a correct value.

5. The station waits for the tip temperature to stabilize, and then the station measures the tip temperature with the tip temperature.

CAUTION

In the offset entry mode (when the display is flashing), the tip temperature is controlled by the current offset value.

6. Check the difference between the tip temperature and the set temperature.
7. MAINTENANCE

• Tip maintenance

1. Tip temperature

2. Cleaning

3. After use

4. When the unit is not being used and the auto power shutoff is not active.

5. Inspecting and cleaning the tip

High temperatures shorten tip life and may cause thermal shock to components. Always use the lowest possible temperature when soldering. The excellent thermal recovery characteristics of the HAKKO FM-203 ensure effective soldering at low temperatures.

Always clean the soldering tip before use, to remove any residual solder or flux adhering to it. Use the 599B tip cleaner (provided with the HAKKO FM-203) or use a clean and moist cleaning sponge (part no. A1519). Contaminants on the tip have many deleterious effects, including reduced heat conductivity, which contribute to poor soldering performance.

Always clean the tip and coat it with fresh solder after use. This guards against oxidation.

Never allow the unit to idle at a high temperature for extended periods. This will allow the tip to become oxidized. Turn the power switch OFF. If it is to be out of service for several hours, it is advisable to pull the power plug as well.

This procedure, if followed daily, will materially add to tip life.

a. Set the temperature to 250°C (482°F).

b. When the temperature stabilizes, clean the tip (see 2. above) and check the condition of the tip. If the tip is badly worn or deformed, replace it.

c. If the solder plated part of the tip is covered with black oxide, apply fresh solder, containing flux, and clean the tip again. Repeat until all the oxide is removed, then coat the tip with fresh solder.

Remember to NEVER file the tip to remove oxides!

d. Turn the power OFF and remove the tip, using the heat resistant pad. Set the tip aside to cool.

e. Remaining oxides, such as the yellow discoloration on the tip shaft, can be removed with isopropyl alcohol.
6. PARAMETER SETTINGS

- **Parameter entry mode process**
  Select the parameter entry mode using the following operation.

  ① Turn the power on while pressing the **Up** button.
  The station enters the parameter entry mode.

  ② Select the parameter number.
  Initially, the temperature display is displayed, and the tens digit begins to flash. Use the **Mode** and **Up** buttons to change the parameter setting, or press the **Down** button to select the units digit. Enter the parameter number and press the **Mode** button to go to the next step.

  ③ Select the number for setting the parameter setting in the preceding step.
  The current setting is initially displayed. Use the **Mode** button or button to enter the parameter setting. Press the **Mode** button in steps ② or ③ to return to step ②.

  ④ After the necessary parameters are set, press and hold the **Mode** button in steps ② or ③ above for two seconds.
  The display changes to and the station asks whether to exit the parameter entry mode. Select and press the **Mode** button to exit the parameter entry mode.

- **D/S : Temperature display (°C or °F)**
  The HAKKO FM-203 has the following parameters.

<table>
<thead>
<tr>
<th>Number</th>
<th>LED display</th>
<th>Setting</th>
<th>Default setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td></td>
<td>°C display</td>
<td>°F display</td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>Sleep time</td>
<td>On: 6 min; Off: 1 min</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>Low temperature warning</td>
<td>Low temperature warning</td>
</tr>
<tr>
<td>04</td>
<td></td>
<td>Power supply</td>
<td>Off: On:</td>
</tr>
<tr>
<td>05</td>
<td></td>
<td>Power supply</td>
<td>On: Off:</td>
</tr>
<tr>
<td>06</td>
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<td>Power supply</td>
<td>On: Off:</td>
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<tr>
<td>09</td>
<td></td>
<td>Power supply</td>
<td>On: Off:</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Power supply</td>
<td>On: Off:</td>
</tr>
</tbody>
</table>

**NOTE:**
- Auto sleep can be set separately for channels D and S.
- Each time the **Up** or **Down** button is pressed, the display toggles between the following displays: and .
- When is selected, the parameter number selection screen in step ② is displayed.
- When the display changes to and , the station enters the mode for changing the temperature display.
- Press the **Up** or **Down** button to switch the display alternately between (Fahrenheit) and (Celsius).
\(\text{02 : Auto sleep setting}\)

Set the time until the auto sleep function activates after the soldering iron is set on the iron holder.

**Auto sleep examples:**

- \(\text{02} \) Sleep (immediately after the iron is set on the iron holder)
- \(\text{02} \) Sleep (10 minutes after the iron is set on the iron holder)

**NOTE:**

- The auto sleep time can be set in units of minutes (up to 29 minutes).
- The auto sleep time can be set separately for channels D and S. The channel that can be set is the channel for which the channel display lamp is lighting during parameter entry.

- The tip temperature is reduced to approximately 200°C during sleep mode. Note that no precise measurement has been performed. The tip temperature varies significantly, depending on the ambient environment, tip type and iron types. 200°C (400°F) should only be used as a guide.

- When the display is \(\text{SLEEP} \), press the \(\text{UP} \) or \(\text{DOWN} \) button, or remove the soldering iron from the iron holder to resume power to the heater.

**NOTE:**

The sleep function will not activate when the set temperature is less than approximately 300°F.

\(\text{03 : Lower temperature error setting}\)

**Lower temperature error**

- When the temperature drops below a set limit, an error is displayed and the buzzer sounds. When the temperature returns within the allowable range, the buzzer stops.

**Low temperature setting range**

for Celsius: 30 to 150°C
for Fahrenheit: 50 to 300°F

**Example:**

When the set temperature is 350°C and the low temperature error setting is 100°C, a warning buzzer sounds when the temperature drops to 250°C.

\(\text{04 : Offset-free mode}\)

- When the station is in the offset-free mode, either \(\text{A} \) or \(\text{J} \) is displayed.
- \(\text{A} \): The offset value cannot be entered without the control card inserted into the station.
- \(\text{J} \): The offset value can be entered without the control card inserted into the station.

Select \(\text{UP} \) or \(\text{DOWN} \) and press the \(\text{*} \) button.

\(\text{05 : S-E, C-E buzzer sound setting mode}\)

- In the buzzer sound setting mode, which sets whether to sound the buzzer when a sensor error \(\text{A} \) or \(\text{I} \) soldering iron error occurs, either 0 or 1 is displayed.
- \(\text{A} \): The buzzer does not sound.
- \(\text{B} \): The buzzer sounds.

Select \(\text{UP} \) or \(\text{DOWN} \) and press the \(\text{*} \) button.

\(\text{06 : Set temperature alert setting mode}\)

- In the set temperature alert setting mode, either \(\text{A} \) or \(\text{J} \) is displayed.
- \(\text{A} \): The buzzer does not sound when the soldering iron reaches the set temperature.
- \(\text{B} \): The buzzer sounds when the soldering iron reaches the set temperature.

Select \(\text{UP} \) or \(\text{DOWN} \) and press the \(\text{*} \) button.

\(\text{07 : Auto sleep function setting mode}\)

- In the auto sleep setting mode, either \(\text{A} \) or \(\text{J} \) is displayed.
- \(\text{A} \): The auto sleep function is off, regardless of the auto sleep set time.
- \(\text{B} \): The auto sleep function is on, and the auto sleep time is activated.

Select \(\text{UP} \) or \(\text{DOWN} \) and press the \(\text{*} \) button.

\(\text{08 : Auto shutoff function setting mode}\)

- In the auto shutoff setting mode, either \(\text{A} \) or \(\text{J} \) is displayed.
- \(\text{A} \): The auto shutoff function is off, regardless of the auto sleep function set time.
- \(\text{B} \): The auto shutoff function is on, and the auto shutoff time is activated.

Select \(\text{UP} \) or \(\text{DOWN} \) and press the \(\text{*} \) button.