








## FR-1012B Operation and Maintenance Manual



# Safety Labels

Safety labels are located throughout the machine, indicating certifications of conformity and personal safety warnings such as pinch points, burn hazards, or electrical hazards.

**Table 1: Safety Labels**

Safety Label	Hazard Description
	<p>The Burn Hazard tag shows the location of very hot equipment. Contact may cause burns as a result of contact with the designated source.</p>
	<p>The Electrical Danger tag shows the location of hazardous electrical equipment. Contacting dangerous electrical equipment may cause electrical shock or burn.</p>
	<p>A Pinch Point Hazard represents locations where machine movements are dangerous to fingers and hands. Keep hands and fingers clear of all designated points.</p>
	<p>This tag represents a hot surface or heat source that may cause personal injury due to burns. Caution should be exercised to avoid hot surfaces. Protective personal equipment should be readily available to individuals using this equipment.</p>
	<p>Electrical tag represents the location of an Electrical Hazard. Caution should be exercised around electrical equipment to avoid injury due to burns or shock.</p>

Information in this manual is subject to change without notice. The information in this manual is offered in good faith as representing typical values and not as a product specification. No warranty, either expressed or implied, is made.

The suggested handling procedures detailed in this document are believed to be generally acceptable. However, each user should review these recommendations in the specific context of the intended use, and for agreement with company safety policies and governmental regulations in effect at the plant or facility where they are being used.

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# 1.0 Introduction

The FR-1012 is a bench-top board heater designed to elevate the temperature of printed circuit board assemblies so the components on them can be soldered or de-soldered easily. This is particularly useful on medium to high-mass board assemblies, which can “*heat-sink*” a significant amount of energy supplied by a soldering iron tip, or handheld hot-air tool.

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**CAUTION: As with all heating devices, exercise extreme care when using and handling this unit. The circuit board, fixture, and other surfaces may get very hot, especially during prolonged use at higher power or temperature settings**

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**Table 2: FR-1012 Board Heater Specifications**

<b>Board Capacity</b>	12 x 15 Inches	305 x 380 mm
<b>Heated Area</b>	10 x 12 Inches	250 x 305 mm
<b>Heater Watts</b>	1,200 W	
<b>Heater Type</b>	Low Mass Quartz I/R	
<b>Thermocouple Inputs</b>	(1) Type K	
<b>Controller</b>	Industrial Microprocessor	
<b>Operating Modes</b>	Power Mode, or T/C Mode	
<b>Power Requirements</b>	100 - 120V / 12A Standard 200 – 240V / 6A Optional	
<b>Size</b>	14" W x 18" D x 5" T	360 x 460 x 130 mm
<b>Weight</b>	16 Lbs.	7 Kg

## 2.0 Safety and Operation

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**CAUTION:** As with all heating devices, exercise extreme care when using and handling this unit. The circuit board, fixture, and other surfaces may get very hot, especially during prolonged use at higher power or temperature settings.

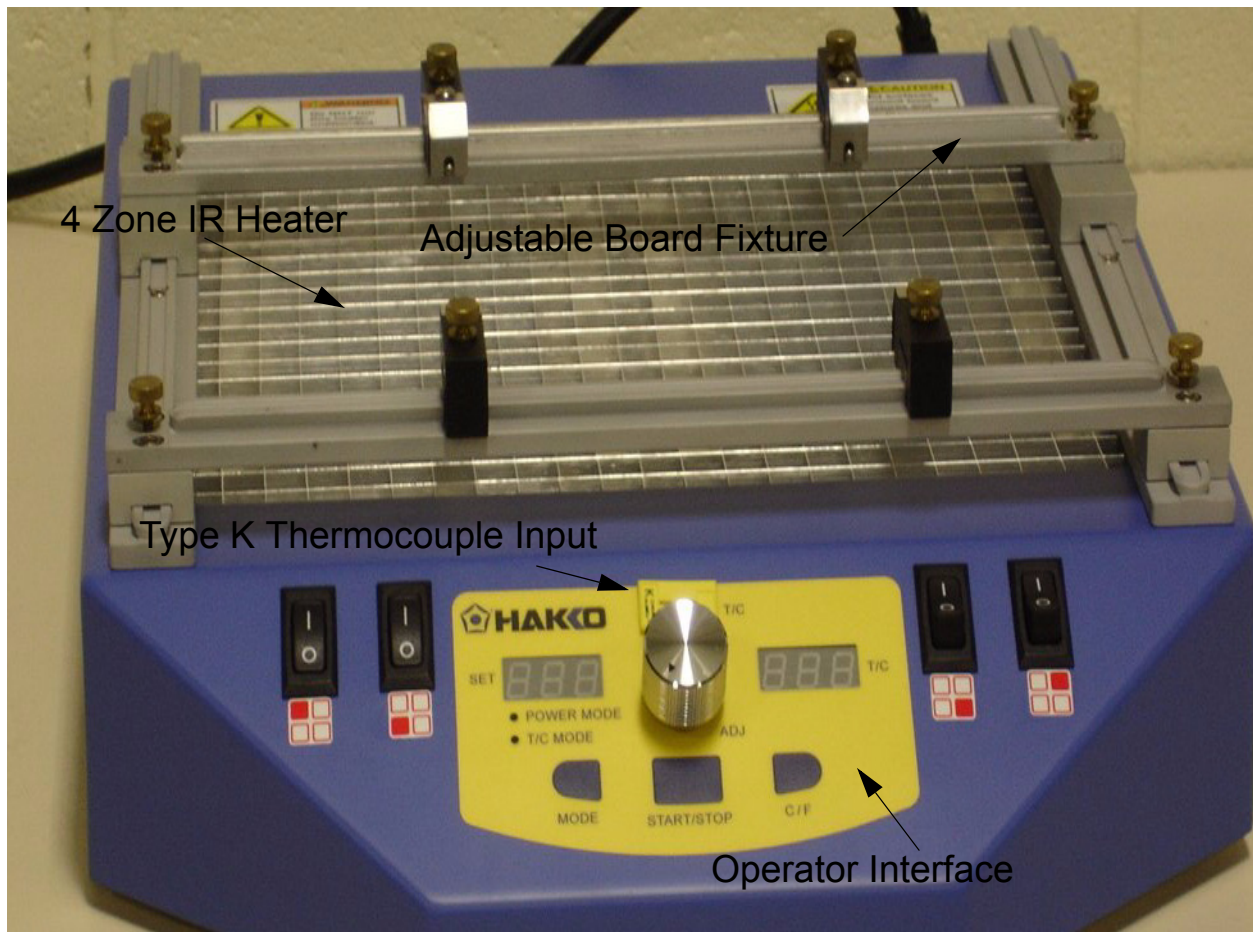
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**CAUTION:** Unplug the unit before removing the top cover, or otherwise attempting to service the unit. There are live, high voltage electrical components underneath the cover even when the power switch is in the OFF position.

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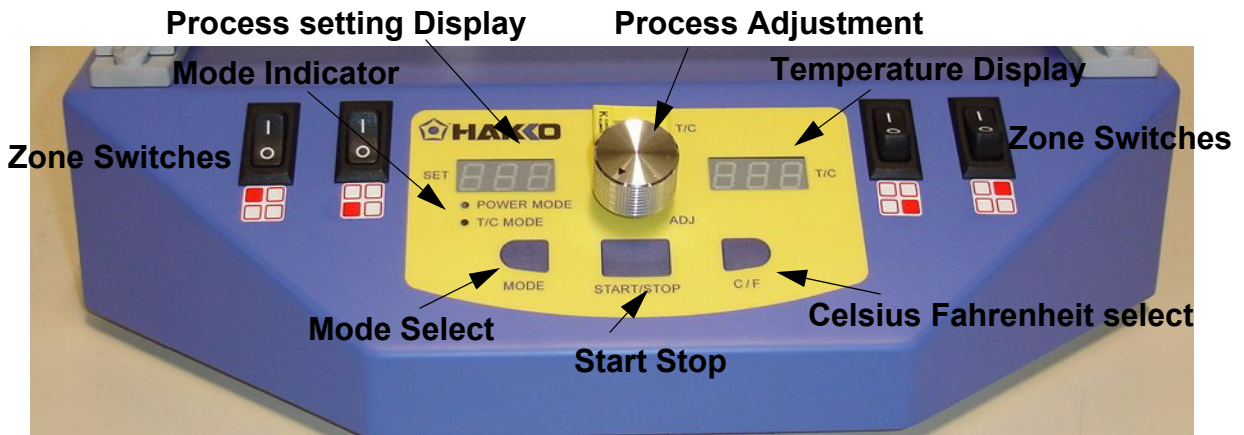
Figure 1: Layout of the Heater Unit



**Figure 2: Rear View - Layout of the Unit**



**Figure 3: Layout of the Unit - Operator Interface**



# Setup

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**To set up the heater, follow the steps below.**

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1. Carefully unpack the unit and place it on a level bench or table.
2. Connect the power cord to the socket at the rear of the unit.
3. Check the serial number label for the correct power supply requirements and plug the unit into the supply.
4. The unit is now ready to run.

# Operation

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**To use the heater, follow the steps below.  
(Use the Figure “Operating the Heater” on page 8 for reference.)**

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1. Mount a printed circuit board assembly (PCBA) on the fixture. ( See *Figure 4 “Operating the Heater”* on page 8.) A variety of board fixture clips and supports are available as options for boards that are odd-shaped or difficult to hold.
2. Attach a Type-K thermocouple (T/C) to an ungrounded area of the PCBA to monitor the board's temperature, or operate in the closed-loop *T/C Mode*.

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**NOTE: An erroneous T/C reading may result if the T/C is electrically connected to the unit's ground through the board fixture.**

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All of the buttons on the control panel work as toggles. Press and release the buttons to operate. Do not hold the buttons in or you may inadvertently toggle several times unexpectedly.

3. Select a control mode, by pressing the *Mode Select* button to toggle between *Power Mode* and *T/C Mode*.
4. Select degrees C or F for temperature readouts by toggling the *C/F Button*.
5. Press and release the *Start/Stop* button once to start operation in either mode.
6. Adjust the *Set Value* or *Percent Power* while the unit is running by turning the *Adj Knob*.
7. You may turn on individual zones by toggling the appropriate zone on / off switch.

**Figure 4: Operating the Heater**



## **Power Mode**

**Power Mode** allows the **Output** of the unit to be set manually. The **Output** is set by rotating the **Process Adjust Knob** to the desired percentage of output power, which displays on the left-hand L.E.D. readout. When running in this mode, the unit will output the set percentage of power, regardless of the T/C actual value. A thermocouple is not required in this mode, but may be used to monitor the actual board temperature.

**Power Mode** output is measured in percent of Power ( 0 - 100%). Though **Power Mode** does not operate at a temperature setpoint parameter, a thermocouple can be used to monitor actual board temperature. The actual temperature depends on a number of variables such as board size, thickness, composition and component types.

## **T/C Mode**

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**NOTE: A Type-K thermocouple must be secured to the PCBA and plugged into the unit's T/C jack for T/C Mode to work correctly.**

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**T/C Mode** allows the desired temperature to be set for the PCBA for closed-loop control of the temperature using the **T/C Input**. The desired temperature from 50 to 180°C (122 to 356°F) is set by rotating the **Process Adjust Knob** to the desired temperature for closed-loop control, which displays on the left side of the L.E.D. readout.

When running in **T/C Mode**, the unit will apply 100% power until the board reaches 10°C below the set temperature. The unit will then start **PID Control** to regulate the power output of the heater to hold the PCBA at the set temperature.

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**CAUTION: Unplug the T/C whenever it is not securely attached to a PCBA mounted on the board fixture. An open (unplugged or broken) T/C will read 999 on the right-hand display, and prevent accidental operation in T/C Mode which will apply 100% power until the T/C approaches set temperature.**

**If a T/C is plugged in, and not securely mounted to a PCBA in the fixture so that it can read the board's temperature, the unit will continue to apply 100% power indefinitely, possibly damaging the PCBA.**

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## Programming Timeout

The FR-1012 Heater can be programmed for Timeout, which represents the amount of time the heater stays on before it automatically turns off. This is a safety feature which prevents operators from leaving the heater on for an extended period of time. **Timeout** is accessed in **Setup Mode**. The **Timeout** parameter is prefixed by a “C” and there are 5 possible settings from 0 to 60 minutes.

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**To program Timeout, follow the steps below.**

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1. Enter **Set Up Mode** by pressing both the **MODE** and **START/STOP** buttons simultaneously. A letter “C” appears in the right display as shown in Figure 5 below.

**Figure 5: Use Setup Mode to Program Timeout**



2. Press the **START/STOP** button to move through the **Set Up Mode** options to **Timeout Setting**.  
The display on the right shows the letter **"C"**.

**Figure 6: Setup Timeout**



**The value shown following the letter “C” indicates the timeout period. (C 15 parameter represents 15 minutes until Timeout.)**

**00 = Timeout Disabled. No Timeout is set.**

**05 = 5 Minutes until Timeout.**

**15 = 15 Minutes until Timeout.**

**30 = 30 Minutes until Timeout.**

**60 = 60 Minutes until Timeout.**



3. The value shown following the letter “C” indicates the number of minutes until the Timeout period begins and the heater turns off. For example, C 15 means that the heater will operate for 15 minutes and then turn off.

- 00 = Time out disabled. No Timeout is set.
- 05 = 5 Minutes
- 15 = 15 Minutes
- 30 = 30 Minutes
- 60 = 60 Minutes

4. Press the **C/F** button to change the time out setting.

5. Press both **MODE** and **START/STOP** buttons simultaneously to store the new setting and exit **Set Up Mode**. (See “Save Timeout setting & exit Setup Mode”.)

**Figure 7: Save Timeout setting & exit Setup Mode**



**Figure 8: FR-1012 Front Panel**



## 3.0 Maintenance and Care

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**For best performance, observe the following:**

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- Use reasonable care to keep flux and debris from falling into the heater
- Do not pour liquid fluxes directly onto PCBA mounted on the machine.
- Periodically clean the board fixture rails. You may optionally unplug the unit, and apply a thin layer of Teflon lubricant to the aluminum rails. Be careful not to pour or spray lubricant into the heater panel.
- Do not touch the quartz-halogen bulbs with your fingers or hands. Oils from your hands will create hot-spots on the bulbs, leading to premature failure.

### Changing a Heater Bulb

One defective bulb may cause three or more bulbs to not operate. A failed bulb can be identified by close visual inspection for a broken filament, or discoloration. Before attempting to replace a defective bulb, turn the heater off, and unplug the unit. Allow the heater to cool if necessary

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**To replace a defective bulb, follow the steps below. (Refer to “Layout of Bottom Heater” on page 14 for reference.)**

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1. Turn the heater off and unplug the unit. Allow the heater to cool, if this is necessary.
2. Remove the (6) screws securing the board fixture to the unit base.
3. Lift the board fixture off as an assembly.
4. Carefully remove the Housing/Cover, lifting it straight up, and then to the Left. There is a ribbon cable plugged into the Operator interface. It is not necessary to unplug this cable.
5. Remove the Honeycomb Grille.

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**NOTE: Do Not touch bulbs with bare hands. Use a clean towel or cotton glove to handle the bulbs.**

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6. Use a clean towel or glove. Locate the defective bulb(s) and remove it by gently pushing to one side, and then rotating the bulb up out of the bulb holder fixture.
7. Insert a new bulb into the fixture. Check that it is properly seated on the contact pins by rotating it and gently rocking it side to side. You should feel the bulb being suspended by the contact spring, and it should rotate a small amount freely on the contact pins.

8. Clean any debris out of the heater panel reflectors.
9. Re-assemble the cover and board fixture, taking care by tucking the ribbon cable into the operator interface inside the Housing/Cover on the left side of the unit, without pinching the cable.
10. Plug in the unit, turn on the power to test.

**Figure 9: Layout of Bottom Heater**

