

Coffee Bean Roaster Setting Manual

By DJW 2/15/05

Temp selections and roast air temperature:

This information outlines how the appliance converts user settings to roast air temperatures. There are 34 temperature settings from 320 to 485 that are converted to 3 normal fan speed settings and one hidden fan speed setting. It is the fan moving air over the heater coils that create the roast air temperature. Anything that changes input air temperature, heater coil temperature or air volume over the coils will change the roast air temperature. The following rules summarize how to predict what the roast air temp will be at each setting. The details of these rules may change from machine to machine dependent on software and factory calibration settings. They are repeatable, however they do not totally explain all software behavior. More observations or detail from the manufacturer is needed.

Measured temperatures below are for an empty chamber (no beans) at 70F ambient room temp and 120VAC line voltage.

- Rule 1:** Low Heat (high fan): **400F**; for all temp settings 320F to 385F.
- Rule 2:** Medium Heat (medium fan): **445F**; for all temp settings 390F to 410F.
- Rule 3:** High Heat (low fan): **465F**; for all temp settings 415F to 485F.
- Rule 4:** For stage 1: High Heat settings are ignored and entered as Medium Heat.
- Rule 5:** For all stages: The **first three minutes** of the complete profile are ignored and limited to LOW Heat; regardless of what stage the profile is in.
- Rule 6:** For Stage 2 & 3: Extra High Heat, **490F**, is available in minutes 13, 14 and 15 if you use any temp setting of 470F to 485F.
- Rule 7:** Roaster Air Temps are directly affected by ambient temp, LINE voltage and changes in airflow.
 - a) Each 1.0 volt change in line voltage changes roaster air temp by 5F.
 - b) Each one degree change in ambient room air temp will change roaster air temp by one degree.
 - c) Restricting airflow (same as slowing fan speed) increases roast air temp.
- Rule 8:** If two or more temp increases are commanded from one stage to the next, the unit may step fan speed with an interval as short as 15 seconds or as long as 3 minutes, rather than making the two step change immediately upon entering the stage.

Example 1: Roasting Outside. In the kitchen the ambient temp is 70F and the LINE voltage is 119VAC (with unit ON). If I roast in the garage rather than the kitchen, where it is 50 F, and the line voltage is 115VAC (with unit ON), then calculate the lowered roast air temp: The total of: 20F lower ambient combined with (4VAC x 5F per VAC) or 20F, is 40F. Thus the roaster air temps will be lowered by 40F from the roast air temperatures in the kitchen and I need to change the roast profile settings accordingly. For my machine, the HIGH and EXTRA HIGH fan settings are the only ones that will get hot enough to do the roast.

Summary of ideas to use these rules to your advantage. (not my ideas):

- a) For cold outdoor use, put the appliance in a box. As it runs, the ambient temp in the box warms up, which warms up the roast air temp, which warms up the box... creating a ramp profile.
- b) Allow the chaff collector or cap screen to become clogged with chaff as it runs. If it happens at the correct rate, it will cause a restricted airflow at a rate that could approximate a drum profile. Since this is quite literally blocking airflow over the coils, it could also destroy the machine or let the smoke out of the beans.
- c) Improve repeatability of roast profiles by keeping input conditions constant; LINE Voltage, Ambient Room Temp, and eliminate air restrictions due to chaff (use smaller loads of high chaff beans and do chaff collector mods)..

By using these rules and running a test chart of your units performance, you can more accurately predict how it will perform in a changing environment or when using a different kind of bean.

Check the performance of a machine by running the profile: 325F/5; 400F/5; 485F/5. Put NO beans in the pot and measure the temperature entering the pot at the base with a digital thermocouple thermometer.

Then apply the test profile along with measured bean temperatures profiles to optimize the length of time in each temperature zone.

Keep in mind that since this appliance gets red hot in the heater area, fire safety procedures need to be practiced. Follow the safety instructions in the manufacturers manual.