Appendix B

Operating Instructions

The roaster is designed for continuous use.
The machine is designed for most seeds and nuts bigger than 3mm.

It will not get damaged if it is run without product. The rotor must turn when you have put product in. It is better to stop the rotor when all the particles have fallen out of the machine.

PLEASE do not roast material with particle sizes smaller than 2.5 mm, because it will fall through the rotor apertures and cause smoke - The machine can also catch fire on the inside, especially if it is not cleaned when roasting products with high fat content, like groundnuts and macadamia.

The dust tray
The dust tray is installed to catch small particles that would fall through the screen. It can be cleaned daily if necessary.
Close the dust tray underneath the unit before you start the machine, otherwise the machine will not work.

Starting procedure
The continuous roaster is adjustable in two ways : Temperature and Time.

If you would like to roast the product at a high temperature for a short time, you set the temperature at the set-point and the adjust the speed of the rotor fast to achieve short-time high-temperature roasting.

If you want a low temperature slow roast, you can set the temperature at a the chosen set-point and adjust the rotor speed slow to achieve your desired result. Lower rotor speed means that the product stays longer inside the machine, and the machine will have a lower capacity and *vice versa.*

The capacity is adjustable between 50 kg/h up to 400 kg/hr, (R300E Model) depending on the degree of roasting, and the thermal treatment of the seed. We can do 50 kg per hour on Groundnuts and soy beans, but also 400 kg/h for blanching of peanuts and up to 500 kg/hr to pre-heat sunflower seed before cold-pressing. For this application we will have to change the drive gear ratio.

The incubation unit (if needed) is a thermal insulated box underneath the roaster outlet. This unit helps to thoroughly after-cook the roasted product. It also make a big difference in colour development in roasted groundnuts (Maillard browning reaction).
The unit is equipped with a cooling section underneath to cool the product down after incubation. The processed product is automatically discharged by the delivery auger.

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1. Temperature adjustments :

Before starting the machine, make sure all control switches are in the "off" position.
Press the green button and start the Forced Convection Fan. Set the temperature to the desired value. For most products an ideal starting temperature will be approximately 170°C, but at higher capacities the temperature must be higher for example : 225 °C at 90% capacity for soybeans.
Please try to keep the temperature lower than 250 °C

Make sure that the big fan motor is running, because this motor drives the forced convection fan inside the machine (If the motor does not run, press the red button and get an electrician to attend to the machine.)
The temperature will start to rise gradually to the set value. The large red indicator light is on, indicating that the elements are turned on and is adding heat to the air stream inside the machine.

When the set temperature value is reached, the red light will turn off and on, indicating that the elements turn off an on. The electronic thermostat will turn the elements off and on as heat is needed to keep the temperature at the set level inside the machine.

2. Rotor speed adjustment

The rotor carry the product through the machine.
The rotor speed is adjustable, so you can roast product fast or slow at a certain temperature.

By playing around with the temperature and speed settings, you can achieve optimal roasting conditions for your product.

Do not adjust the speed while your sample is inside, because you will not know if the initial setting was correct.

The variable speed controller can be adjusted between 0 and 120. This is an indication of the output frequency to the rotor motor. You must use it to see at what speed your product is roasted optimally.

(If you take the safety screen off, you will notice that the rotor is turning faster at a higher speed setting, but be careful that parts of your body do not get caught between the chain and the sprockets)

Example :
Say you would like to roast groundnuts.
1. Make sure the power supply is on and all switches are in the "off" position
2. Close the dust cover under the processing unit.
3. Press the green button
4. Adjust the temperature to 200 °C
5. Turn the rotor on and set the speed reading to 65 Hz

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6. Wait for the temperature to rise to the set-point.- The red light will turn off if the temperature is reached.
7. Put a hand full of peanuts in the intake funnel.
8. Start your stopwatch
9. Wait for the peanuts to travel through the machine.
10. The nuts will fall out within ± 8 minutes.
11. Stop your stopwatch when the peanuts start to fall out. - Now you have the time that the product stays inside the machine at a speed setting of 65Hz and temperature of 200°C
12. Evaluate the product.
13. If it is too dark, it means that the time spent inside the machine was too long. - You must set the rotor faster for a shorter time.
14. Set the speed to 70 Hz.
15. Repeat the procedure from no.7, until you find the optimal speed setting and roasting time at 200°C.
16. Continue to increase or decrease the speed setting to find the optimal roasting time for your product at 200 °C
17. You can now do the same procedure for 190°C or 220°C.

Remember : Equal sized particles will roast equally.
Do not put in different size particles in one batch, because the small ones will all be darker and the larger ones lighter. You must have equal sized nuts or seeds if you want to get a proper result.

For a test run, make sure that the temperature set-point is reached and that the rotor is turning at the required speed.

Put 5 kg in the inlet hopper.

You have to keep the inlet hopper full. The machine will continuously pull the product in.

Maintenance
Your electrician can re-tighten all the electrical connectors inside the control box after one week's operation. The screws tend to relax with time and variations in temperature, causing a possibility of hot connections. (It is only necessary to do this once.)

The machine has an external bearing on the rotor drive shaft. This bearing can be greased every fortnight.

The other end of the rotor is supported in a *Teflon Ring* inside a taper-lock bush that may need replacement after about 2000 hours.
Elements may fail from time to time, but we use elements that has a life expectancy of more than 10 years.
The bearings of the *Forced Convection Fan* may be replaced after 5000 hours, or when necessary.
The speed reducing gearbox is designed for continuous use and an oil replacement may be necessary after 3000 hours.

The dust trap under the rotor has to be inspected and emptied daily. This must be done more frequently when small particles is not removed from the product prior to roasting.

Please contact us if you have any questions or visit us at www.roastech.com
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