

CARE AND FEEDING OF YOUR KILN

When you first get your kiln it can be pretty intimidating. I've found knowing what is *normal* can ease a lot of apprehension. Hopefully this will save you a lot of unnecessary stress and worry. Although much of the information in this handout applies to all kilns, most of the programming information is geared to the Paragon SC kiln series with the Orton Sentry 4 controller.

KILN: A BOX THAT GETS HOT

To quote John Hohenshelt, former President of Paragon Industries, "A kiln is a box that gets hot." Its needs are fairly simple.

1. Insulation (Ceramic Fiber Muffle, or Kiln Bricks)
2. Heat Source (Elements)
3. Heat Control
 - a. Computer Controller
 - b. Thermocouple
 - c. Relay

Most Ceramic Fiber Muffle kilns are smaller and plug into a regular household 120v outlet. Ceramic fiber heats much more quickly than fire brick, making it much more economical to use. While a few brick kilns do run on household current, most require a 240v outlet.

KILN OPERATION

The kiln controller wants to know three things

1. Ramp Speed
 - a. This is the rate at which it gets hot. For example, a ramp speed of 200 would take 5 hours to get to 1000. A ramp speed of 500 would take 2 hours to get to 1000.
2. Temperature
 - a. This is the target temperature you are aiming for
3. Hold time
 - a. How long to hold AFTER reaching target

Once programmed the controller and the thermocouple have a conversation. The controller wants to know if the kiln is over the target temperature. If the answer is no, it stays on. If the answer is yes, it sends a command to the relay to shut off. Then it will query the thermocouple to see if it's below the target temp. It will stay off until the answer is yes, at which point it will turn on again. It is NORMAL OPERATION for the temperature to drift 10 to 15 degrees above and below the target temperature. The average temperature will be your target temp.

CARE AND FEEDING OF YOUR KILN

KILN PROGRAMMING

The Orton controllers have 5 single speed presets and 4 multi-phase ramp/hold custom user programs. For more information on how to use the controller, see the YouTube videos linked below

PRESET SPEEDS

<https://youtu.be/PP3nILdageQ>

CUSTOM RAMP/HOLD MULTI-PHASE PROGRAMS

<https://youtu.be/nVCWiCvH1QE>

PROGRAMMING TIPS AND TRICKS

The controller can do a lot more than just ramp and hold. Here are a few tricks to try. See your user manual for specific instructions on how to program these features.

- 1) Program Review – Handy to check the settings of and saves on button pushing
- 2) Delay start – Use if you're going to be out of the house for a while or have other equipment running that may cause too much of a power draw for the circuit.
- 3) Skip Segment – Skip the current segment if the firing is done but time is left. For example, if the glass is fused to the desired level and you don't want it to continue firing, you can skip to the cool down/annealing phases.
- 4) Add Hold time – You can add time to a firing segment if glass is not fully fused at end of fusing cycle, or if witness cones have not fully matured.
- 5) Changing target temperature – You may want to change the target temp if glass is not fusing or if changing to enamels that have different firing requirements. It's not necessary to stop the kiln and reprogram using this feature. NOTE: To set a temp LOWER than current temp will require opening the door until the temp drops below desired temp.
- 6) Temperature alarm - You can set an alarm to sound at a specific temperature to remind you to check a glass fusing, or for other reasons. You can also use it to sound an alarm if the kiln temp gets too high to avoid burning out the kiln.

CARE AND FEEDING OF YOUR KILN

ERROR MESSAGES

What should you do if you get an error message?

- 1) TAKE A PHOTO OF THE ERROR MESSAGE
- 2) Take a photo of the data plate on the side of the kiln
- 3) Note the temperature the kiln was at when the error occurred.

Should you need to contact the manufacturer of your kiln they will need all this data to help you.

Here are some common error messages

TC – thermocouple failures

tC – thermocouple failure

solution - replacement

tCL – thermocouple lag

kiln heating too slowly. example of ramp speed not set correctly
possible bad element.

PF – Power Failure errors

May need to re-fire

HtdE – High Temp Deviation

Kiln heated too fast. Often a problem when trying to maintain lower temps.
Use lower ramp speed.

Always check your manual first. You may be able to fix it yourself. If you do need to contact the manufacturer, be sure to send them the photos and the temp at time of failure.

TROUBLESHOOTING

The door is loose! What do I do?

One of the most common misunderstandings is thinking the door should create a tight seal with the body of the kiln. Not true. While the kiln door does hold in heat, by design it does not create a tight seal. The insulating material of your kiln, whether it is ceramic fiber or brick, will expand as the kiln heats and contract as the kiln cools. This expanding material must have somewhere to go, so the door is designed to have a certain amount of play to accommodate the changing conditions. If it were tight, as people often expect, the door would end up cracking or possibly even breaking when the insulation expands on heating.

CARE AND FEEDING OF YOUR KILN

What about lost heat from the gap around the door?

The short answer is, this isn't a problem. Don't worry about it. The long answer is a bit more complex.

Most of us are familiar with convection heat. Heat travels with the movement of air molecules. This is a good enough explanation for things like stoves and hair dryers, but physics is a funny thing and the behavior of heat changes as temperatures get higher. You know that hot air also expands as it is heated. That means as it heats, there is more and more room between the air molecules. By the time you get to about 1100 F there is so much room between the molecules that, in fact, there is virtually no air left in the kiln at all. So, if there are no air molecules moving around to transfer the heat, what is causing the temperature in the kiln to continue to rise? Here we have moved from the world of convective heat to the world of "radiant" or "line-of-sight" heat. Air movement no longer plays any part. If I put my hand near that gap in the door, yes, I will feel heat; but it has no bearing on the firing going on inside the kiln. I am not "losing" any heat because my firing does not depend on air movement but rather on line-of-sight from the elements. When you open your kiln, the temperature drops, not because hot air is escaping your kiln, but rather cool air from the room is entering your kiln. As long as the pieces in your kiln are exposed to the element heat then they are firing properly.

Understanding how your kiln fires can help you make better decisions when you load your kiln. For example, if I use kiln posts to stack extra shelves in the kiln, I need to make sure the shelves are far enough apart so they don't block the line of sight from the elements. If you put the shelves too close together the items on the edges may fire okay but the items in the middle, blocked from the radiant heat, may not. For this reason, I use kiln posts that are at least 2" tall. This will give me enough clearance so everything on the shelves are exposed to the radiant heat. Also, I may avoid putting any items between the posts at the front of the kiln by the door. There are no elements in the door and the posts themselves may block the radiant heat from the sides. I won't stack a shelf all the way up at the top either. There are no elements in the roof of an SC kiln and the shelf may be above the element on the sides, so again, no radiant heat reaching items way up there.

The ceramic muffle in my kiln is cracked!

Your ceramic muffle may have had small cracks on arrival, or it may develop them over time and use. Minor cracks in ceramic fiber are another area where people often worry needlessly. They do not affect the operation of the kiln. As the kiln heats and the fiber expands, these small cracks will tighten up. Unless pieces are falling out, or the elements have become exposed, the cracks are merely cosmetic and do not affect the kiln operation. If it appears that pieces of the muffle may fall out or the elements

CARE AND FEEDING OF YOUR KILN

become exposed, then contact your kiln manufacturer for a filler material that can be easily applied to repair these minor issues.

Remember, a kiln is a tool you are using and will show normal wear over time. Just as your rusty old hammer continues to work just fine, as long as your kiln is firing normally, you should not let these minor cosmetic issues concern you.

There is black stuff on my kiln shelf and/or on the walls/roof of my kiln.

This is normally caused by burnout materials such as cork or wood clay, paper or other materials that are intended to burn up during firing. Usually these items burn out completely, but occasionally they may leave a residue. You should remove the vent plug from the top of your kiln when burning out materials. If you don't, you may end up with black marks around the door on the face of the kiln. This is cosmetic discoloration only and doesn't affect the kiln operation.

To remove black marks from the inside of the kiln, take everything but the shelf out of the kiln and fire it to 1600 for 10 minutes or so. At this point the ceramic fiber muffle and shelf should be white again. If it is not, then your kiln may not be firing completely. If this happens you may need to contact your kiln manufacturer for additional help, but it's very rare and it is unlikely you will ever have this problem.

My kiln won't come on!

First, is it plugged in? If so, is there power coming from the outlet? Try plugging in something you know works such as a radio. If that won't come on either, then the problem is the outlet, not the kiln. If the outlet works, then the next thing to check is the kiln's fuse. The fuse is located on the back of the kiln near the power cord. Unplug the kiln and remove the fuse by pressing on the fuse holder and turning counterclockwise half a turn. Fuses are cheap. Take it to the hardware store and they can get you another like it. Once you have replaced the fuse, try powering up the kiln again. If you know the outlet and the fuse are good and it still won't come on, then it may be time to contact your manufacturer for additional help.

What's a thermocouple and why do I need to know?

The thermocouple is the little wire poking in from the back of your kiln and it senses the temperature inside the kiln. You need to know enough about it so that you don't accidentally interfere with its operation. The thermocouple needs to extend half an inch or so into the kiln. If it gets mashed back into the muffle then the muffle, doing its insulating job, will prevent the thermocouple from getting an accurate reading. You tell the computer to fire to 1400; the thermocouple, sitting insulated back inside the muffle is only getting a reading of 500 degrees and tells the computer to give it more heat. Before you know it, the kiln is at 2000 and you've got a puddle of melted silver. So,

CARE AND FEEDING OF YOUR KILN

make sure you don't smack the thermocouple with a shelf or anything else when taking items in and out of your kiln. Likewise, don't have anything touching or blocking it from getting an accurate reading during firing. If you set up a shelf directly in front of the thermocouple or have a piece sitting too close to it, this can act as a heat sink pulling heat away from the thermocouple and giving the computer inaccurate readings to work with. Picture half and orange sitting over the thermocouple and keep that area clear of anything during firing.

COMMON QUESTIONS

What do I do about debris in the kiln?

Vacuum it out. Wear a mask when vacuuming. Don't vacuum the thermocouple.

Can I store/use my kiln in the garage?

You can store your kiln in the garage, but it should not be fired in freezing temperatures. Bring your kiln up to room temperature before firing. Firing freezing coils can damage them.

Can I cool items from the kiln on top of it?

NO! The paint on the kiln is not heat safe and will burn and smoke.

SENTRY 5 CONTROLLER

At the time of this writing, the Sentry 5 controller had JUST come out and was not in my hands yet. All the notes above were written for the Sentry 4 controller. Some of the new features of the Sentry 5 are:

- 25 custom user programs (instead of 4)
- 20 phase programs (instead of 8)
- Temperature alarms

There may be other features, but I have no knowledge of them at this time.