How to Build Your Own Controller

Version 3.1

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Designing your own kiln control center is highly rewarding and beneficial as it truly puts the control of your system in your own hands. By following a few suggestions this can be a relatively simple project which can save you hundreds if not thousands of dollars over the cost of store bought models. The very best thing about designing your own controller is you can place the components where you want them.

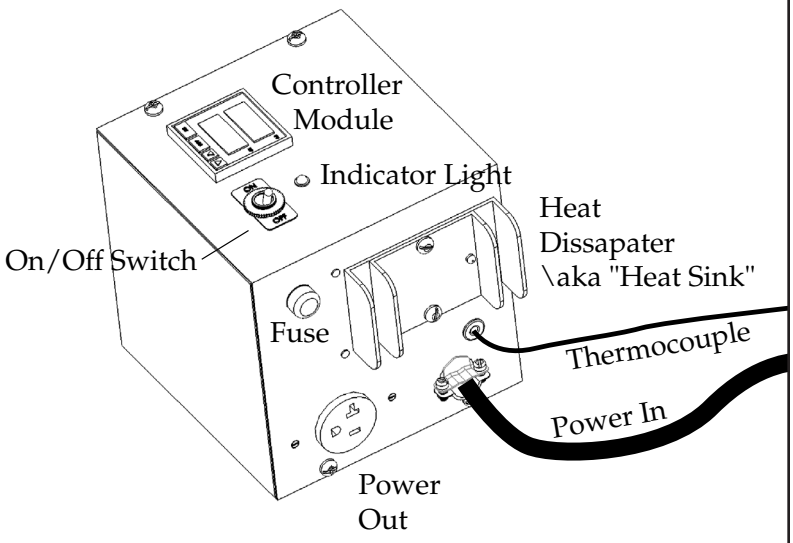

Fig. 01 This stand-a-lone controller can deliver 30 ramp and soak cycles to control any kiln heating or cooling need.

We will begin by building a simple bit box controller, called a set-point controller. Next we will build a stand-a-lone control box, shown to the right, figure 1, that can control a sophisticated 30 ramp and soak program capable of handling the most complicated fusing and annealing cycles. This controller can manage a large 100 cubic foot slumper/casting kiln to a small bead annealer and it can handle any of your high temperature glass melting furnaces too.

A little background— before this era of digital control most craftspersons were forced to rely on erratic and uniquely peculiar methods for determining specific temperatures: throwing a balled up newspaper into a kiln and counting off time before it would explode into flame was a standard pre-pyrometer determinant. I have a friend who bakes in a clay oven. He refuses to put a pyrometer on the unit. Fred's unique test for temperature is to plunge his naked arm into the main opening and begin counting seconds. The counting stops when it gets too hot. If it's twenty-five to thirty, it's perfect for bread! Twenty is way too hot.

An analog pyrometer is a big step up from this hair burning torture, but that doesn't control anything. It just lets you know approximately where the temperature is. For most kiln crafts a type "K" thermocouple attached to an analog pyrometer is sufficient, it functions from room temperature to about 2350˚F. before the thermocouple melts. In the analog world you watch the pyrometer: when the temperature gets too hot, you turn the power down; when it's too cool, you turn it up. You can be busy, busy, busy.

In the world of pottery the quintessential temperature control devise is the Orton cone system. Potters stack their kilns and place among the wares sets of cones that melt at various temperatures. For example, a cone 9 melts at 2300˚F. and a cone 10 melts at 2345˚F. The kiln operator watches the cones through a spy hole. When he sees cone 9 begin to bend the caution flag is hoisted. He has reached a specific temperature: he can go on or stop.

Now enter the digital world. You want the temperature to be 1000 degrees, you set the controller to 1000. If the temperature is below 1000 the controller turns the power on, and if it rises