Zone Control Kiln Addendum

SKUTT
CERAMIC PRODUCTS

WHAT IS ZONE CONTROL

Ever since the first kiln was fired kiln makers have sought ways to distribute heat more evenly throughout the kiln. Zone Control has been around for quite some time however until recently the cost of the technology restricted it's use to highly technical industrial type kilns. Just as with automatic controllers, the cost of Zone Control technology has reached a level which makes it affordable for studio sized kilns.

The idea of Zone Control is to use multiple thermocouples to control various sections of the kiln. Traditionally kilns fire hottest in the center and cooler in the bottom and top. At Skutt we balance the elements to compensate for this natural variation in temperature however the elements are designed with the assumption that the kiln will be loaded evenly. The more mass you place in a particular section of a kiln the cooler it will fire. For example, if you were to load shelves of tile closely spaced in the bottom of the kiln and tall thin vases in the middle and top of the kiln it is likely that the tile in the bottom will be under fired.

Zone Control kilns overcome this problem by placing a thermocouple in each section of the kiln. Each thermocouple sends an independent signal back to the controller. The controller then processes the temperature information for each section and determines whether the section is following the program. If the section is firing cool it will send a signal to the relay which will energize the elements in that section.

Tighter Controls

The Controller has a programmable "lag" feature so the user can determine how much the temperature in any zone can lag behind the desired temperature of the program. The controller senses when any section is lagging behind the desired temperature setting and keeps the controller from increasing the current temperature setting (ramping) until the lagging section catches up. Ramping is only suspended when a section is behind by more than the programmable "lag". A smaller "lag" will result in tighter controls between the sections but may cause a slower firing if one section has proportionally weaker elements or the load is extremely unbalanced. The default setting for the lag is 10 degrees F. Therefore anytime a section is more then 10 degrees behind the current setting the controller will wait for the lagging section to catch up before increasing the current set point. The default setting can always be reinstated by entering the reset command.

Thermocouple Failure Control

Zone Control offers additional security through it's three thermocouples. A thermocouple can fail and stop the firing with a single zone controller. The Zone Control will continue firing if one or two of the thermocouples fail during a firing. If the top or bottom thermocouple fails the section with the failed thermocouple will fire with the middle section. If the middle thermocouple fails the middle section will fire the same as the top section. The Zone Control will not start a firing with a failed thermocouple. The Zone Control will also give an error message (Errd) if any section gets more than 100 degrees F above the set point. Thermocouples in the wrong section, or a stuck relay can cause an Errd message.

ADDENDUM

(continued)

ZONE CONTROL CONTINUED

PROGRAMMING YOUR ZONE CONTROL KILN

Your zone control kiln programs very much like the standard KilnMaster single zone automatic kilns. These programming instructions can be found in the standard KM Operating Manual (owner's manual).

In addition to all the features found on the KilnMaster single zone kilns, your new zone control kiln has some added features and programming ability. These features are accessed by using the "F/C" (Fahrenheit / Centigrade) button in the upper right hand corner of your kiln touch pad. Listed below are the programming features unique to the Zone Control Models:

"F/C" MENU

All programming options are accessed by first pressing the "F/C" button. After pressing this button, it is necessary to press two additional numerical buttons to access a certain feature.

RESET

The reset feature returns all programming options to default conditions. These conditions are: Thermocouple offsets are set at zero, LAG is set to 10 degrees, and error checking is set to "ON". It is best to use this feature if you are unsure of programming that may be already entered in your kiln's computer. This feature clears all programming and returns the computer to factory conditions. Reset does not reset firing programs.

To access this feature press: "F/C" , 7, 0
The message "rSEt" will be displayed
Press "ENTER" and the message "CPL" will be displayed momentarily.
Your kiln's computer should now display "IDLE" alternating with the kiln temperature.
Your kiln's computer is now reset to factory default conditions.
You may now reprogram your kiln and start a firing.

LAG

"Lag" is represented by the number of degrees that any zone is allowed to trail behind the other zones before the firing will be slowed to allow the lagging zone to catch up. Setting the LAG feature lower than 10 degrees can substantially increase the firing times since the kiln can only fire as fast as the slowest zone allows. The factory default setting is 10 degrees. This setting is recommended for most firings.

The maximum LAG setting is 50 degrees. This setting will give the fastest firing times with the least amount of zone control.
To access this feature press *"F/C 7 7"*
The display will read °FLG and will alternate with the current setting (in degrees).
Use the numerical keys to set or change the current value.
Press ENTER to invoke the new setting.

Bd t

The temperature of the kilns circuit board (computer) can be read using this feature.
To access this feature press "F/C", 7, 5
The temperature of the circuit board will be displayed.
This feature is useful if the kiln is operating in a hot atmosphere. If the kiln's computer overheats it will malfunction. See your owners manual for further instructions relating to proper kiln spacing and cooling.

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ZONE CONTROL CONTINUED

tC 1, tC 2, tC 3

With a Zone Control controller you can monitor the temperature in each zone of the kiln. The default setting for the thermocouple reading is tC 2 (thermocouple 2). This is the temperature of the center zone. If you would like to view what the temperature is in tC 1, the top zone or tC 3, the bottom zone, simply press the corresponding number on the touchpad. The temperature reading will display that zone until you enter the number of another zone.

THERMOCOUPLE OFFSETS

It is possible to make individual sections of the kiln fire hotter or cooler by using this feature. The maximum offset that can be used is 50 degrees. This feature can be used to fine tune the kiln using pyrometric cones on shelves in the various sections.

In most cases it is not necessary to offset the thermocouples and if done wrong it can cause firing problems which are difficult to diagnose. Please contact the factory to attain instructions for this feature.

SETTING SINGLE ZONE AND 3 ZONE CONTROL

As mentioned earlier there are times when you may want to operate the kiln without the 3 Zone Control feature. When elements begin to weaken the kiln may lose the ability to complete a firing in the 3 zone control mode or extend firing times beyond acceptable limits. This will happen when the kiln lacks the power to maintain minimum temperature rate increases when 1 or 2 of the sections cycle off to allow a slower section to catch up with the program. This will express itself as an Err1 error if the kiln is unable to maintain a temperature rate increase of at least 12° an hour and the controller will stop the program.

If your firing does not require the tight temperature control of zone control and adjusting the lag will not solve the problem the second option is to turn Zone Control off completely and have the kiln cycle all sections together using the input of only the center thermocouple.

This is only a temporary solution. We suggest that you find the root source of the problem which will most likely be the need for new elements..

Turn Zone Control Off

PRESS "F/C"
PRESS "8"
PRESS "1"
PRESS "1" (1 Zone)
PRESS "ENTER

Turn Zone Control On

PRESS "F/C"
PRESS "8"
PRESS "1"
PRESS "3" (3 Zones)
PRESS "ENTER

2 Zone Control may also be selected for 2 section kilns with 2 thermocouples.

ADDENDUM

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